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Great deeds are done and great discoveries made."

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Yours sincerely,
H. W. Edwards.

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MORE HEBRIDEAN DAYS. II: THE ISLE OF BENBECULA.

BY J. W. HESLOP HARRISON, D.SC., F.R.S.

LAST season we began our usual researches on the Isle of Coll, but, inevitably, the call of the Outer Isles was felt, and we made our way to the Isles of South Uist and Benbecula, on both of which we accomplished some very satisfactory work.

Throughout our stay on Benbecula the weather was exceptionally windy and occasionally rainy. Nevertheless, from the plant-hunting standpoint, we regarded it as ideal; on the other hand, never at any time were we able to devote our attention to the insects with any hope of adequate return. In spite of this, our captures were not without interest, and in describing a typical excursion we made they will be placed on record.

It was a fine morning as we struck along the Peter's Port road with but little to interest us until a sheltered ditch on the wayside revealed a colony of the Water Mint (*Mentha aquatica*) which was being freely patronized by the Hebridean Bee, *Bombus smithianus*. As we halted to watch its operations we noted that the plant was riddled with holes, and closer inspection revealed that countless tiny larvae of *Arctia caja* were hard at work increasing the damage. Leaving them to continue the process we took the "School" path, which soon crosses the upper arm of Loch Leiravagh. Around the school were patches of nettles which harboured the Psyllid, *Trioza urticae*, abundant galls of *Perrisia urticae* and larvae of the moth *Simaethis fabriciana*. Hereabouts, too, the first *Aglais urticae* put in its appearance in a rather large and dark guise.

Very soon the path struck across the moorlands to Craigastrome, and we began to realize two things, firstly, that it was indeed true that Benbecula was more water than land and, secondly, that far from being the dull, expressionless island of our first impressions, it could assume phases of beauty that many of the more favoured isles lacked. Often lying at the foot of gentle flower-clad slopes one would strike small lochs, fringed with vegetation, glowing with the red berries of the rowan and sprawling with honeysuckle. Near one of these the party split up, and two of us decided to work its insect treasures, more especially as it was sheltered by a hill over 60 ft. high, and also because it carried a good flora.

Unfortunately, at this juncture, we made our acquaintance

with our first midge attacks of the year, and they were indeed virulent. However, we persevered and our first captures included numerous *Bombus smithianus* at flowers of the Fine-leaved Heath and the Devil's-bit Scabious. On brambles by the loch-side there occurred galls of *Perrisia plicatrix*, whilst on the heather, tormentil and grasses swarmed larvae of *Bombyx rubi*. The loch itself produced but few beetles and no Corixids. However, we did manage to capture *Dytiscus punctulatus*, *Gyrinus natator*, *Agabus arcticus* and *Hydroporus erythrocephalus* amongst the Coleoptera, and *Gerris costae* and *G. thoracica* of the water-bugs.

Not far away, on the south side of Oban Uaine, a nest of *Bombus smithianus*, as usual above ground amongst heather, was seen, and, what was more interesting, the mating habits of the bee were studied for some time.

The cliffs enclosing this inlet produced interesting vegetation like the Filmy Fern and aspen, but the only insects noted were galls of the gnats *Itomyia major*, *Rhabdophaga rosaria* and *R. salicis* on *Salix aurita*. Rounding further arms of the sea toward Craigostrome we came across a bankside carrying the Gentian (*Gentiana campestris*), and on this plant we were lucky enough to detect the Gentian gall-mite, *Eriophyes kerneri*, reported here for the first time from the Hebrides.

Our course now lay toward Rueval, only 409 ft. high, but, none the less, the highest point on Benbecula. As we pursued our tedious way over broken ground we encountered at intervals galls of the Psyllid, *Livia juncorum*, on various species of Juncus. On the heather, too, crawled the ever-present *Bombyx rubi*, whilst Dr. W. A. Clark had the good luck to pick up a specimen of *Calaena haworthii* which could only be referred to the ab. *erupta* Frey.

As we neared Rueval, amongst the fresher and more luxuriant heather odd larvae of *Apatele menyanthidis* and of *Ceramica pisi* began to turn up, whilst, not far away, on an uninviting loch side, Mr. R. B. Cooke noticed a single *Argynnis aglaja* driving along before the wind. Here, likewise, I observed *Vanessa atalanta* for the first time.

We climbed Rueval from the east and sheltered side, and, in doing so, worked many rock faces, nearly all of which revealed cocoons of *Abraxas grossulariata* on the overhanging twigs of heather. From them, too, started swarms of dark-coloured *Dysstroma citrata* (= *Cidaria immanata*). Moreover, a picturesque and well-protected little ravine on the north-east was very productive of plants, and, where it forked, carried a large thicket of really flourishing *Salix aurita* which yielded the usual midge galls and multitudes of larvae of *Acalla hastiana*. It also gave us the only example of *Bombus jonellus* var. *hebridensis* taken by us on Benbecula.

We found it impossible to stand on the top of Rueval owing to the wind, and therefore descended once more to the cliffs, on one of which we found a solitary plant of *Rosa canina*. This bush had obviously supported crowds of rose-feeding larvae which had pupated before our advent. It did, however, still carry Aphidid larvae which could only be referred to *Macrosiphum rosae*. More important than this, however, was the presence of two plants of *Cerastium arcticum* growing on a ledge at roughly a height of 350 ft., and new to the Outer Hebrides. These were infested by larvae of a *Macrosiphum*, identical, so far as I could see, with those on rose, but possibly appertaining to the species *Macrosiphum stellariae* Theob.

At this point, by some mischance, instead of turning westward we were tempted by the unusual plants there prevalent to wander around Loch na Beire to reach the north side of the island on the Sound of Flodday.

Loch na Beire, itself, gave us little except in a little sandy bay; still, its rugged sides were intertwined at intervals by plants of *Rubus saxatilis*, *Rubus caesius* (new to the Outer Isles) and honeysuckle. The second named plant, although in small quantity, displayed a new "substrate" for the gnat *Perrisia plicatrix*. It should be added that, in this area, as elsewhere, the Sweet Gale afforded food to crowds of larvae of *Eucosma dimidiana*. Just away from this loch, and near a croft, a much shallower body of water produced a few specimens of the dragonfly *Enallagma cyathigerum*, whilst a small stream, in addition to *Gerris costae*, added *Velia currens* to the bag.

Taking now the Gramisdale Road toward the western machair and dunes, we skirted the salt marshes where we found a *Coleophora* on *Juncus Gerardi*, probably only *C. caespititiella*, which abounded on other rushes on the adjacent moorlands. Except for additional interesting plants, we saw little new, although *Bombus smithianus* was as common as ever on thyme, whilst more *Eriophyes kerneri* galls were found on flowery banks. On the roadside, feeding on *Salix aurita*, *Cerura vinula* larvae were of free occurrence, accompanied by further *Arctia caja*. On the dunes themselves, for the first time our old friend *Bombus smithianus* deserted us, to be replaced almost, but not entirely, by *B. hortorum*. This bee freely probed the flowers of *Lotus corniculatus* and *Anthyllis vulneraria*. On the former plant, galls of *Contarinia barbichei* were plentiful enough, whilst a search for eggs or larvae of *Polyommatus icarus* ended in the discovery of the ladybird, *Adalia bipunctata*.

Of butterflies the only species occurring were *Vanessa cardui* and *Aglais urticae*.

Our inclinations now led us past Balavanish, where the usual

Perrisia urticae galls on the common nettle seemed to be displaced by others which could only be assigned to the species *Perrisia dioicae* Rübs. This appears a very remarkable observation, when one considers the restricted distribution of this species in Britain.

Near Nunton we digressed to examine Loch na Liana Moire, adjoining which ragwort provided us with a good supply of *Hydraecia lucens* and a sprinkling of *H. crinanensis*, as well as with *Aglais urticae* and *Vanessa cardui*. The loch, itself, proved a veritable "gold-mine," for it swarmed with insects and water plants. Of the former the only Lepidopteron was *Hydrocampa nymphaeata*, which had obviously fed on *Potamogeton natans* and also on *P. coloratus*, the latter a plant new to the Outer Hebrides. Both of these, as well as several other water plants, had been badly eaten by larvae of the moth as well as by those of various Trichoptera. Amongst the latter netted were the species *Limnophilus marmoratus*, *L. sparsus* and *Triaenodes bicolor*. Only one dragonfly, *Sympetrum danae*, was captured.

Aquatic Coleoptera and waterbugs proved not uncommon, and they are set out in the general list at the end of this paper.

As time was now limited we pressed homeward, only pausing at intervals as interesting habitats were encountered. These added to our list of beetles, etc., and incidentally provided us with *Perrisia hygrophila* on *Galium palustre* and *P. galiicola* on *G. verum*. Moreover, throughout the remainder of the journey, an interesting form of *Colostygia didymata* flitted about in some quantity, no doubt tempted out by the lulling of the wind. As our last capture, just as we completed our circle, a nearby bush of *Salix atrocinerea* supplied full-grown larvae of *Cerura vinula*.

List of Aquatic Coleoptera occurring on Benbecula.

Haliplus confinis Stph.
H. fulvus F.
H. lineatocollis Marsh.
Coelambus inaequalis F.
Deronectes assimilis Payk.
Hydroporus palustris L.
H. erythrocephalus L.
H. obscurus Sturm.
H. tristis Payk.
H. gyllenhalii Sch.
H. pubescens Gyll.
Agabus arcticus Payk.
A. bipustulatus L.
A. chalconotus Panz.
Agabus sturmii Gyll.
Ilybius fuliginosus F.
I. aenescens Thoms.
Rhantus bistriatus Berg.
Dytiscus punctulatus F.
Colymbites fuscus L.
Gyrinus marinus Gyll.
G. minutus F.
G. natator Scop.
Philhydrus fuscipennis Thoms.
Laccobius alutaceus Thoms.
L. minutus L.
Helophorus viridicollis Stp.

LIST OF WATER-BUGS OCCURRING ON BENBECULA.

Corixa castanea Thoms.
C. nigrolineata Fieb.
C. scotti Fieb.
C. distincta Fieb.
Callicorixa wollastoni D. and S.
Arctocorisa carinata Sahl.
Notonecta obliqua Gall.
Velia currens F.
Gerris costae H.S.
G. thoracica Schum.

Dept. of Botany,
King's College,
Newcastle-upon-Tyne.

APATURA IRIS IN BERKS.—I netted a rather battered male at 4.15 p.m. B.S.T. in a lane bordering Oak Copse, half a mile from here on July 6. Have previously seen a freshly emerged female in same spot at 10.15 a.m. B.S.T. on August 3, 1938, and a fresh male in those grounds on July 14 at 10 a.m. B.S.T. Both these last were on the ground.—(Capt.) ALBAN F. L. BACON; The Malt House, Burghclere, Newbury, July 10, 1940.

IMMIGRANT LEPIDOPTERA IN DURHAM AND NORTHUMBERLAND.—Owing to the pressure of the large amount of extra work I have undertaken, last season I made but few local observations. *Vanessa atalanta* came into the house during the first week in June, and later, on September 6, it was seen flying both in Northumberland (Corbridge) and Durham (Birtley), but not in any numbers. *Plusia gamma* was observed singly on July 6, and early in September almost as rarely, in both cases at Birtley, Durham. Lastly, on September 15 Mr. W. Eltringham was fortunate enough to capture a male *Herse convolvuli* at Ryton, Co. Durham.—J. W. HESLOP HARRISON.

ASSEMBLING OF THECLA QUERCUS.—Three collectors have informed me that in August last at Ashtead, Surrey, one of them happened to strike a branch of an oak tree with his net " whereupon a cloud of purple hairstreak butterflies flew out of which seventeen were easily captured by the three nets." I had a similar experience with this insect at Bookham, Surrey, in 1935, the tree, however, being hawthorn, a record of which appears in the *Entomologist*, **69**, 14.—A. A. W. BUCKSTONE; 90, Pams Way, Ewell, Surrey.

IMMIGRATION OF PIERIS BRASSICAE.—As I have not seen in the *Entomologist* any allusion to the remarkable immigration of *P. brassicae* during the past season, I think it is worthy to place on record. There evidently must have been one of the biggest invasions of this butterfly ever known. From inquiries made from various places throughout the country, extending from Mid-Scotland to Ireland, they have swarmed. Their numbers have been so great that they have been reported resembling snowstorms in all parts of the country. In reply to my inquiries respecting the destruction of *P. brassicae* by birds as recorded by me in *Entom.*, **73** : 137, Lord Bolingbroke tells me " the Tits have again attacked the whites, and I have seen numerous wings strewn about."—F. W. FROHAWK; October, 1940.

RECORDS OF A NEW FOREST MOTH TRAP.

By C. W. Mackworth-Praed, F.R.C.S., F.R.G.S., M.B.O.U.

In view of the fact that the use of "light" is denied to us for probably some time to come, it may be of interest to review the results of a light-trap in the New Forest for the last five years.

Some interesting figures were published recently of the catch of a light-trap at Rothamstead, but the paucity of Lepidoptera taken appeared surprising, as well as the observed fact that the majority of insects visited the trap at early dusk. I shall have more to say about this later, as I think the majority of lepidopterists will agree with me that "light" is not much use before 11 p.m., or even later during the summer months.

My own trap is a cube some 5 ft. each way, and is placed on a small balcony 20 ft. above ground facing S.S.E. It overlooks a stretch of woodland and pasture, with heath all the way round, but is sufficiently high, about 300 ft. above sea level, for one to be able to see the Isle of Wight some ten miles away. It is powered by two lights of 100 or 150 candle-power each, and is made in such a way that an alarm clock operates a lever which both cuts off the light and closes the trap door. This "door" is a long piece of glass about 5 in. wide and 5 ft. long, with rubber pads along both edges. All the glass is plate glass $\frac{1}{4}$ in. thick, and the rest of the trap is of wood painted white inside.

A vertical view of the trap with the roof removed and the "door" open would be represented by the accompanying figure.

A and B are the front glass sheets of the trap, C is the swivelling rubber-padded "door." D and E are glass "guides" only, which do not touch the glass front by some 2 or 3 in. F and G are doors, the former large enough to enable one to get inside the trap. H and I are swivelling posts carrying the lights.

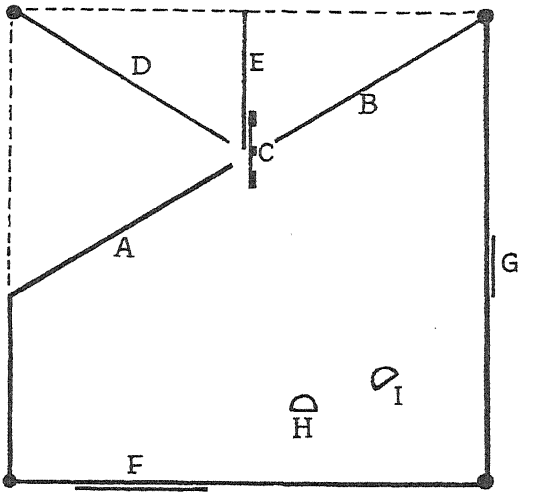
The mechanism which actuates C is a simple spring on a long lever arm, which in turn is released by another arm at right angles to it being withdrawn by the action of an alarm clock which simultaneously breaks the light contact. I have not drawn it as there are many possible forms of such an arrangement, but the suitable mechanism and the clock must be in a box together, and some care must be taken to break the lever arm with a piece of non-conducting material for obvious reasons.

There should also be slats or sheets of 3-ply resting on the floor or against the sides of the trap which give a space of an inch or so into which insects can crawl to hide from the light, otherwise they knock each other about too much. It is obvious that there can be many variations and improvements to such a trap, but size is essential; and the sheets of glass, mostly about 5 ft. by 4, are very

heavy, so that substantial construction is necessary, as is also some form of penthouse roof to withstand weather.

During the last five years I have kept a record of every moth that has been attracted more or less, and although the trap has only been in use at week-ends and holidays, a total of some 350 species of "Macro-Lepidoptera" is encouraging, while some records are of distinct local interest.

It is also possible to set the trap to start catching and to close automatically at any period of the night, and this has led me to



suspect a source of error in the Rothamsted experiments. I find very definitely that after the trap has been in use the night before there is a rush of insects at dusk, but if it has not been used for a week, such does not occur. It would appear that a large number of insects come up to within light range, say 100 yards, the first night, and then stay in trees and herbage nearby for the day, and it is these that constitute the early rush when the light appears the next evening. Normally, however, comparatively little occurs till 11 p.m. summer time, and the main rush is about midnight.

It is my custom to release all moths on the opposite side of the house, and the opening of the window in the morning is the signal for the arrival of an assortment of birds. There are usually some six Chaffinches, several Tits, of three or four species, a pair of Robins, a Hedgesparrow or two, and a pair of Blackbirds, besides occasional Nut-hatches, Sparrows, and other birds.

I have long since discarded any theory of "warning coloration." Everything, Tigers, Cinnabars, Ermines, Noctuids, Hawks, and Geometers, is immediately attacked and eaten, whether in movement or not; nor do there seem to be any distasteful insects, nor even any for which preference is shown. Unfortunately, also, the birds have discovered the attraction of the trap itself, and any insect which is resting on the outside is only a little pile of wings by the time I examine the trap in the morning, the chief culprits being Chaffinches.

There is little new that can be added on the subject of weather. A moon is, of course, a deterrent to moths, as is also frost or fog, but the best nights have been not, as I expected, warm cloudy nights, but warm clear nights with no moon. There are also different optimum nights for Noctuids and for Geometers, but I have not got sufficient data on this subject yet.

As will be seen from the table, insects have been taken in every week of the year, but a most interesting point to me is the remarkable consistency and regularity with which the first appearance of a species takes place each year, though its maximum hatch varies with the season.

The average catch on a good night in the end of June or in early August, which seem to be the two best periods, is 100 to 150 moths of some 40 to 50 species. The best night record was 289 moths of 59 species, and the maximum number of species in the trap at one time has been 68, twice.

The most abundant species in point of numbers are *Orthosia cruda*, *Lycophotia varia*, *Deuteronomos erosaria*, and *Omphaloscelis lunosa*. I find that taking all nights year in and year out, my trap's average catch is 25 moths per night in a bad year, and nearly 40 in a good one.

The moth-trap has given me a great deal of interest for a comparatively small expenditure, and such a trap can be set by anyone the night before, so that a mere week-ender can profit by it for three nights a week. The one drawback is the time it takes to clear and name the catch each morning. I defy anyone to catch, classify and enter up 150 moths in much less than an hour.

The list of species follows, and for the sake of brevity I have divided each month into four periods, the figures meaning as under :

1 = 1st week, or 1st to 8th of month.
2 = 2nd week, or 9th to 16th ,,
3 = 3rd week, or 17th to 23rd ,,
4 = 4th week, or 24th to 31st ,,

The nomenclature is in accordance with the latest edition of South (1939).

SPHINGIDAE.

Sphinx ligustri, 4/5 to 2/7, common most years, often 4 or 5 in trap at same time.

Hyloicus pinastri, 2/6 to 1/8, one or two only each year; very liable to settle and remain on outside glass and be eaten by birds in the morning.

Deilephila elpenor, 2/7, only one occurrence.

D. porcellus, 4/6, only one occurrence; both species seem curiously rare.

Smerinthus ocellatus, 4/5 to 4/6; common 1938, rare otherwise.

Laothoe populi, 3/5 to 3/8, abundant; freshly emerged specimens occur up to end of July at least.

NOLIDAE.

Bena prasinana, 3/6 to 2/7, odd specimens only.

Pseudoips bicolorana, 1/7 and 2/7, odd specimens only.

Sarrothripus revayana, 2/8; only one example, though the moth is not uncommon locally.

Celama confusalis, 1/6, as above.

ARCTIIDAE.

Miltochrista miniata, 1/7 to 3/8, common, often abundant.

Cybosia mesomella, 2/6 to 3/7.

Eilema griseola, 3/7 to 1/8, both forms, but not common.

E. deplana, 3/7 and 4/7.

E. lurideola, 2/7 to 3/8, abundant.

E. complana, 3/7 to 4/8.

E. sororcula, 2/5, one only.

Lithosia quadra, 2/7 to 3/8, a few of each sex in most years.

Coscinia cribraria, 4/6 to 1/8, odd examples only.

Callimorpha jacobaeae, 3/5 to 3/7, common in all years.

Diacrisia sannio, 3/6 to 1/7.

Spilosoma lutea, 1/6 to 2/7 } equally abundant.
S. lubricipeda, 2/5 to 2/7 }

Cycnia mendica, 2/4 to 4/5, one also 2/7, presumably of a second brood.

Phragmatobia fuliginosa, 4/7.

Apoda avellana, 2/7.

LYMANTRIIDAE.

Euproctis similis, 2/7 to 3/8.

Lymantria monacha, 3/7 to 4/8.

Dasychira pudibunda, 3/5 to 4/6.

D. fascelina, 3/7 to 1/8, several in each of the last three years.

Orgyia antiqua, 4/7 to 3/9.

LASIOCAMPIDAE.

Poecilocampa populi, 1/12 to 4/12.

Trichiura crataegi, 2/9 and 3/9.

Malacosoma neustria, 2/7 to 1/8.
Macrothylacia rubi, 4/5, 1/6, ♀♀ only.
Gastropacha quercifolia, 3/6 to 1/8.
Philudoria potatoria, 4/7.

SATURNIIDAE.

Saturnia pavonia, 4/4, 1/5, ♀♀ only; rare in trap; seem to prefer lights of house.

DREPANIDAE.

Drepana lacertinaria, 1/6 to 3/6, 3/7 to 3/8.
D. falcataria, 4/5 to 1/6, 3/7 to 3/8.
D. binaria, 2/5 to 3/6, 3/7 to 3/8.
Cilix glaucata, 1/5 to 1/6, 3/7 to 4/8.
All very regular in appearance from year to year.

NOTODONTIDAE.

Cerura vinula, 1/5 to 4/6.
C. furcula, 1/8.
Stauropus fagi, 1/5 to 4/7, common, ♂♂ only.
Pterostoma palpina, 3/6 to 4/8; common 1938, rare since.
Lophopteryx capucina, 1/5 to 3/6, 4/7 to 4/8.
Odontosia carmelita, 1/5.
Pheosia tremula, 3/4 to 4/5, 4/7 to 4/8.
P. gnoma, 2/4 to 4/6, 4/7 to 4/8, abundant.
Notodonta ziczac, 1/5 to 1/6, 3/7 to 3/8.
N. dromedarius, 1/7 to 4/7.
N. anceps, 2/4 to 1/6, common.
Drymonia ruficornis, 3/4 to 3/5.
D. trimacula, 3/5 to 3/7, common, occasionally abundant.
Phalera bucephala, 4/5 to 1/8.

THYATIRIDAE.

Habrosyne derasa, 2/7 to 1/8.
Thyatira batis, 1/6 to 4/8.
Tethea ocularis, 1/6 to 2/7.
T. duplaris, 1/7 to 4/7.
Asphalia diluta, 4/8 to 2/9.
Achlya flavicornis, 2/3 to 1/4.
Polyploca ridens, 4/3 to 1/5, common.

AGROTIDAE.

Cryphia perla, 1/7 to 3/8.
Colocasia coryli, 1/5 to 2/5, 3/7 to 3/8.
Apatele psi, 1/8 to 3/8.
A. rumicis, 4/4, 1/8 to 3/8.
Leucania lithargyria, 3/6 to 1/8.
L. albipuncta, 1/8.
L. impudens, 1/7 to 4/7.
L. comma, 2/6 to 3/7.
L. impura, 2/7 to 1/8.
L. pallens, 3/6 to 3/9.
Arenostola pygmina, 3/8 to 2/9.
Gortyna flavago, 2/9 and 3/9.
Hydraecia oculea, 3/7 to 2/9.
H. micacea, 4/7 to 3/9.
Axylia putris, 4/7.
Apamea crenata, 3/6.

A. monoglypha, 3/6 to 3/8; surprisingly uncommon in the trap considering its abundance.

A. secalis, 3/7 to 3/8.
A. basilinea, 1/7.
Dipterygia scabriuscula, 3/6 to 3/7.
Tholera popularis, 4/8 to 3/9.
T. cespitis, 3/8 to 3/9.
Laphygma exigua, 1/6 and 1/8; common in 1938.
Cerapteryx graminis, 1/9.
Meristis trigrammica, 3/5 to 3/6.
Thalpophila matura, 3/7 to 3/8.
Caradrina morpheus, 2/6 to 4/6.
Luperina testacea, 1/8 to 3/9.
C. alsines, 3/6 to 3/8, abundant.
Mamestra brassicae, 3/6 to 2/8.
C. blanda, 2/7 to 2/8.
Procus strigilis, 3/6 to 3/7.
C. ambigua, 3/6, 4/8 to 3/9.
P. fasciuncula, 3/6.
C. clavipalpis, 4/7 to 3/9.
Petilampa minima, 3/6 to 4/7.
Rusina umbratica, 4/5 to 3/7.
Peridroma porphyrea, 4/8 to 1/11.
Agrotis puta, 4/4 to 3/6, 3/7 to 3/9.
A. segetum, 3/9.
A. exclamationis, 4/5 to 1/8.
A. clavis, 1/6.
Lycophotia varia, 4/5 to 3/8, in great profusion, often 50 at a time in trap.
Ochropleura plecta, 2/5 to 1/9.
Diarsia festiva, 2/6 to 3/7.
Amathes c-nigrum 3/6, 3/8 to 3/9.
D. rubi, 1/6, 3/8 to 3/9.
A. agathina, 3/8 to 3/9.
D. brunnea, 3/6 to 1/8.
A. triangulum, 2/7 to 3/8.
Lampra fimbriata, 1/8 to 3/9.
A. baja, 3/6 and 1/8.
Triphaena ianthina, 4/7 to 1/9.
A. xanthographa, 2/8 to 3/9.
T. pronuba, 3/6 to 3/9.
A. castanea, 3/9.
T. comes, 3/8 to 3/9.
A. stigmatica, 3/7 to 3/8.
T. subsequa, 3/8.
A. sextrigata, 3/7 to 4/8.
T. interjecta, 1/8.
Amphipyra tragopoginis, 1/8 to 3/9.
A. pyramidea, 2/8 to 1/9; very rare in trap; abundant locally.
Panolis flammea, 3/3.
Orthosia gothica, 1/3 to 4/5.
Cerastis rubricosa, 4/3 to 3/5.
O. incerta, 3/3 to 1/5.
Orthosia stabilis, 3/3 to 2/5.
O. gracilis, 2/4 to 3/5; red form slightly the more abundant.
O. miniosa, 1/4 to 1/5.
Agrochola lota, 3/10 to 1/11.
O. munda, 2/3 to 4/4.
A. macilenta, 3/10 to 1/11.
O. cruda, 2/3 to 1/5.
A. lychnidis, 3/10 to 1/11.
Omphaloscelis lunosa, 1/9 to 3/9, very abundant.
Conistra vaccinii, 4/1 to 4/4, 2/10 to 1/11.
Eupsilia transversa, 2/2 to 4/4, 4/10 to 1/11.
Dasycampa rubiginea, 3/3 to 4/4.
Hadena lepida, 2/8.
Cirrhia icteritia, 2/9 to 3/10.
H. cucubali, 3/8.
Citria lutea, 1/9 to 3/9.
H. thalassina, 3/5 to 4/6.
Atethmea xerampelina, 1/9 to 3/9.
H. w-latinum, 2/6 to 4/6.
Zenobia subtusa, 3/8.
Hada nana, 3/6.
Cosmia trapezina, 3/7 to 3/8.
Aporophyla lutulenta, 4/8.
Hadena bicruris, 3/6 to 1/7.
A. nigra, 2/9 to 1/11.
Meganephria oxyacanthae, 3/9 to 4/10.
Griposia aprilina, 3/10.
Euplexia lucipara, 3/7.
Phlogophora meticulosa, 3/4, 1/6 to 3/6, 3/8 to 3/9.

Polia nebulosa, 3/6 to 2/7. *Diataraxia oleracea*, 3/6 to 1/8.
Ceramica pisi, 2/5 to 3/7.
Xylocampa areola, 2/3 to 2/5. *Cucullia chamomillae*, 1/4 to 2/5.
Graptolitha ornitopus, 2/4. *C. umbratica*, 2/6.
Lithophane socia, 4/4. *C. verbasci*, 3/4.
Scolioptery x libatrix, 3/6 to 1/8.
Abrostola tripartita, 3/6 to 4/6, 4/7 to 4/8.
Plusia chrysitis, 3/6 to 2/9.
P. gamma, 2/5 to 3/6, 1/7 to 3/12.
P. pulchrina, 1/8. *Laspeyria flexula*, 1/7 to 4/7.
Polychrisia moneta, 4/6 to 1/8. *Rivula sericealis*, 3/6 to 3/9.
Anarta myrtilli, 1/8 to 4/8. *Zanclognatha grisealis*, 1/7 to 1/8.
Jaspidea pygarga, 3/5 to 4/7. *Z. tarsipennalis*, 3/6 to 3/8.
Phytometra viridaria, 4/7.
Hypaena proboscidalis, 3/6, 3/7 to 3/9.
Tholomiges turfosalis, 1/8 to 3/8.

(To be continued.)

Pirbright Camp;
November 10, 1939.

POLYGONIA C-ALBUM IN KENT AND SURREY.—Two specimens of *Polygonia c-album* were noted at Thursley, Surrey, on July 14 last year, whilst single examples occurred at Dorking on July 14, 20, 23, 26, 27, 28 and 31. Two have also been seen at Sevenoaks, Kent, on July 20 and 27.—WILLIAM E. BUSBRIDGE; "Gresham," Bradbourne Park Road, Sevenoaks.

SUSSEX BUTTERFLIES IN JULY, 1940.—The mid-season here seems to be early. *Lysandra coridon* at Hollingbury on July 11, and also a second brood *Lycaenopsis argiolus* at Hollingbury and Bevendean to-day. Although spring broods were late, the summer and second broods seem very early. Mr. Toms has searched the downs from Bevendean to Midhurst and no sign of *Colias croceus*. The ordinary Rhopalocera have been out in profusion on Bevendean Bank, Firle, Hollingbury, Ditchling, Wannock, etc. At Firle I never saw so many *Thymelicus sylvestris* and *Ochlodes venata*—each on their respective patch—in my life. *Argynnis aglaja* is very abundant and *Agapetes galathea* almost everywhere along the Eastbourne-Firle-Newhaven Downs in profusion; and this after all those weeks of winter snow.—(Major) H. BLACKISTON; Booth Museum, Brighton, July 12, 1940.

SCARCITY OF GONEPTERYX RHAMNI IN SURREY.—Can any reader of the *Entomologist* inform me if *Gonepteryx rhamni* was generally scarce during the past season? I have failed to observe a single individual of the species during the summer and autumn, although hibernated specimens were common in the spring.—A. A. W. BUCKSTONE; 90, Pams Way, Ewell, Surrey.

IRISH LEPIDOPTERA IN 1939.

By Bryan P. Beirne, B.Sc., F.R.E.S., and Arthur A. Lisney, M.A., M.D., F.R.E.S.

(Concluded from vol. lxxiii, p. 249.)

Addenda et Corrigenda.

Certain corrections and additions are needed in our article as published in the November issue of *The Entomologist* last year. They are detailed below.

In the first paragraph the "one Tortrix" (*Hemimene alpinana*), stated not to have been recorded from Ireland, should be deleted, the statement having been made in error.

P. 243, line 5 from bottom, *for* 27.viii *read* 27.vii.

P. 244, line 16, *for* Cahir- *read* Caher-.
line 22, for *lunigera*, Steph., read *trux*, Hübn.
line 3 from bottom, for *fontes* read *fontis*.

P. 245, line 2, *for* Wolke *read* Wocke.
line 21, *after* Imago bred *insert C. miata*, L. NK.: Cahernane, one larva 3.vii. Imago bred.
line 27, for *Orthonoma* read *Orthonama*.
line 28, *for* 8.vii *read* 18.vii.

P. 246, line 14, *for* Fäb. *read* Fab.; *after* Hübn. *insert* NK:
line 15, *after* Flesk. *insert* Crambidae.—and commence new paragraph.
line 17, *after* Killarney *insert* WC: Glengarriff. WI: The Murrough.
line 18, *add*: *Chilo phragmitellus*, Hübn. WI: The Murrough and Powerscourt.

P. 247, line 10, *delete*: Not recorded previously from Ireland.
line 25, for *Oecogonia* read *Oegoconia*.
line 30, *delete first sentence*: Limnoecia . . . (Halbert).
line 37, *for* Blastobastidae *read* Blastobasidae.

P. 248, line 4, for *Swammerdammia* read *Swammerdamia*.
line 7, for *O.* read *E.*
line 11, *for* Schaff. *read* Schäff.
line 30, before *G. elongella* insert *G. tringipennella*, Zell. DU: St. Ann's, Clontarf.
line 36, *for* Lyonetidae *read* Lyonetiidae.
line 5 from bottom, *after* Ireland *insert T. marginea*, Haw. NK: Cahernane. DU: Howth.

P. 249, line 6, *for* Dolymount *read* Dollymount.
line 14, *for* Nepticulina *read* Nepticulidae; for *submaculella* read *subbimaculella*.

At end of list of references add: *Idem* (1940).—*Entomologist*, **73**: 123, 150.

SOME NOTES ON THE CYNIPID GENUS *ANDRICUS*.—II.

By M. Niblett.

The following notes are intended to record my observations on the galls of some additional species of the Cynipid genus *Andricus* and the insects bred from them. All localities given are in Surrey unless otherwise noted.

Andricus circulans Mayr.—This species, one of the very few affecting *Quercus cerris* L. in Britain, I have found the galls of in several localities where I have had access to its host-plant, these being West Wickham, Addington Hills, Farthing Down and Arbrook Common. It is not an easy gall to find until one has seen a number, then they are easily recognized. The earliest date I have found the gall is April 22 and the latest with the insect still within, June 11, *circulans* emerging from the latter on the same day. I have also had the insect emerge on that date from galls collected May 6, from which all the other *circulans* had emerged in May. My experience is that in almost every case this species emerges in May, from 3rd to 23rd. According to Kieffer (1) the galls are to be found in February and March, and the insect emerges in March, April and May; Dalla Torre and Kieffer (2) state that the gall is mature in March and April, and the insect emerges in April; Ross and Hedicke (3) say the gall is mature in April and May, the insect emerging in May. The suggestion that this species is the probable sexual generation of *Cynips kollari* Htg. I cannot accept. On only one occasion have I had parasites from *circulans* galls, Chalcids emerging on June 11 of first year.

A. glandulae Schenck.—I have already given details (4) of my experiments by which I procured galls of this species on *Quercus robur* L. induced by *A. xanthopsis* Schlct., otherwise all I have obtained have been found on *Q. sessiliflora* Salb. at Croham Hurst, Limpsfield Chart, West Wickham Wood, Friday Street, Banstead Wood, Ranmore Common, Chipstead and Worms Heath; also at Beaulieu Heath, Hants. From 1928 I had been able to find the gall in fair numbers as a rule in most of these localities, but in 1933, 1934 and 1936 they were noticeably scarce, while in 1935 I failed to discover a single gall.

The earliest date I have observed the gall is July 16 and the latest November 9. The gall-wasp usually emerges in the first half of April of second year; emergences are as a rule very small, the galls being heavily infested by both Synergi and Chalcids, the former emerging either in September of first year or April of second, the latter from April to June of second. Riedel (5) states that the insect leaves the gall in March and April of third year.

A. callidoma Gir.—I have spent many hours searching for the gall of this species but with little success: since 1929 I have found in all only 26 galls, one of which was empty. On *Q. robur* the localities are Colley Hill, Ashtead Common, Park Downs, Riddlesdown, Banstead, Burgh Heath, Epsom Downs, Bookham Common, Walton Heath and Broadmoor; on *sessiliflora* at Banstead Wood. The emergences have not been too good either: from 2 galls 7 Synergi emerged, from 5 galls 1 Synergus, while from another series of 5, 1 Synergus and 2 *callidoma* emerged, all the other galls yielding nothing. The gall-wasps emerged on March 19 of third year, the Synergi came out in September of first and April and May of second year. The earliest date I found the gall was June 17 and the latest October 12. Adler (6) draws attention to the heavy attacks of parasites on the gall of this species.

A. cirratus Adler.—I have found the galls of this the alternate sexual generation of *callidoma* even more difficult to find than those of that species. On May 20, 1933, I found several of the galls at Bookham Common on *Q. robur*, and on May 13, 1939, several more were found on *sessiliflora* at Banstead Wood; from these latter 8 *cirratus* emerged May 31, 1939. There appears to have been some confusion regarding the name of the alternate generation of this species; Kieffer appears to think that Adler was mistaken in the identity of the species from which he procured *cirratus* galls, but both the text and illustration in Adler's work do not give me that impression. Dalla Torre and Kieffer reverse this and there Adler is followed, as he is by Ross and Hedicke.

A. giraudi Wachtl.—This gall described by Kieffer, but given as a synonym of *A. callidoma* by D. T. & K., differs according to the former from *callidoma* by having a very long pedicel and being devoid of pilosity. On June 6, 1938, I found 2 galls on *Q. robur* at Effingham which agree with Kieffer's description of *giraudi*; unfortunately I have failed to breed the gall-wasp from these galls. The gall does not agree entirely with D. T. & K.'s description of *A. giraudianus* although rather like it. They were definitely not galls of *callidoma* and I know of no British record of a similar gall.

A. sieboldi Htg.—On very few occasions have I found this gall at all plentiful; it certainly requires a lot of searching for and I think it is more usual to find old galls than fresh ones. I have found it only on *Q. robur* at Limpsfield, Epsom Common, Burgh Heath, Ranmore Common, Oxshott, Wimbledon Common, Ashtead, Bookham Common, Effingham Common and Arbrook Common. The gall-wasp I have had emerge in March and April and have found the galls badly infested by Synergi and Chalcids, these usually emerging soon after *sieboldi* or during the following two months.

I have sleeved *sieboldi* on several occasions on oaks in my garden in the hope of getting galls of its alternate *A. testaceipes* Htg., but without success; I have also failed entirely to find the gall of that species, although I have made several systematic searches in areas where galls of *sieboldi* had occurred in some numbers.

A. ramuli L.—This is another gall which I have rarely found in any numbers. On *Q. robur* I have found it at Epsom Common, Friday Street, Limpsfield Chart, Epsom Downs, Ashtead Common, Park Downs, Coulsdon Common and Walton Heath; also at Bostall Heath, Kent; on *sessiliflora* at Croham Hurst, Banstead Wood and Worms Heath; and Lessness Abbey Wood, Kent. The earliest date I have observed this gall is May 11 and the latest June 19.

The gall-wasp has emerged in some numbers as a rule between June 4 and July 6, the majority emerging in the early part of June; from one gall-mass 52 *ramuli* came out between June 4 and 7, followed by 54 Chalcids between June 18 and 25; all the Chalcids bred have emerged in June except when on one occasion three emerged in the following October. I have bred but few Synergi from these galls, all of which have emerged in early July; one Braconid was also bred in June, but I doubt that any of the Cynipid larvae was the host.

A. autumnalis Htg.—I have only found this the agamic alternate of *ramuli* on two occasions, several galls being found on *Q. sessiliflora* at Limpsfield Chart and several at Croham Hurst in October; it is rather a difficult gall to spot, but probably more close searching in other localities where *ramuli* had occurred would have disclosed others. I have not yet bred the gall-wasp.

A. inflator Htg.—It is much easier to find old galls of this species than fresh ones, but it has definitely been rather scarce in recent years. From 1926 to 1936 I found it to occur in fair numbers; from the latter year to 1939 repeated searches resulted in finding less than six in any one locality, except in one instance, when 18 were found in a small area on Epsom Downs. On *Q. robur* I have found it at Park Downs, Epsom Common, Leatherhead, Carshalton, Banstead, Epsom Downs, Limpsfield Chart, Kingswood, Ranmore Common, Riddlesdown, Bookham Common, Oxshott, West Wickham Wood, Arbrook Common, Effingham Common, Coldharbour Common and Banks Common; also at Epping Forest, Essex; on *sessiliflora* I have only found it at Croham Hurst. May 7 is the earliest date on which I have found fresh galls, and they often remain attached to the twigs for twelve months.

The gall-wasp I have found usually emerges in July, but have had emergences in May and June, and have found the percentage very low; the galls suffer very badly from mildew if kept in a closed container or shrivel and harden if left exposed too much, either

condition not being conducive to the successful emergence of the insect. I have had a few Synergi emerge in May and July of second year, also a few Chalcids in August of first and May of second year.

It is not an uncommon thing to find buds sprouting from the surface of these galls. I found on one occasion in August an *inflator* gall with a gall of *Cynips kollari* Htg. developed from one of these buds.

A. globuli Htg.—The gall of this species I have found on *Q. robur* at Ockham Common, Banstead Downs, Limpsfield Chart, Epsom Downs, West Wickham Wood, Ashtead Common, Riddlesdown, Park Downs, Bookham Common, Oxshott Heath and Effingham Common; on *sessiliflora* at Friday Street, Croham Hurst and Banstead Wood. I have found, as with the gall of its sexual alternate, *A. inflator*, a very considerable falling-off in the numbers observed in recent years. The earliest date I have found the gall is August 14 and the latest November 10, but as a rule the galls drop freely in October.

The gall-wasp I have had emerge in December of second and January of third year; it is not an easy species to rear owing to its remaining in the larval state for a long period. I lost many flies owing to the galls being kept too moist, but it is not advisable to let them get too dry. My emergences appear to be much earlier than those obtained by Adler; the flies he bred emerged in April and the majority of Continental authors appear to have copied this date; Hartig apparently had it emerge in February.

A. curvator Htg.—There is no need to take up space with localities for this species, as its galls are to be found on *Q. sessiliflora* and *robur* in practically all localities where these oaks grow. The earliest date on which I have observed this gall is May 12 and old galls may often be found up to the following autumn.

The gall-wasp I have had emerge from May 31 to July 2, the majority emerging in mid-June; Synergi and Chalcids have all emerged during July. The majority of galls I have kept have given me few parasites, but one series gave three Synergi, eleven Chalcids and not a single *curvator*. This gall I find, like that of *inflator*, is very subject to bad attacks of mildew, so that some care is necessary when keeping it to breed the insect.

A. collaris Htg.—This very inconspicuous gall is, I think, very often overlooked, but if searched for from late September to mid-October should be found in localities where its sexual alternate, *curvator*, had occurred. I have found it on *Q. robur* at Ockham Common, Epsom Downs, Riddlesdown and Ashtead; on *sessiliflora* at Croham Hurst, Friday Street and Banstead Wood. The earliest date I have found it is September 17 and the latest November 9.

The gall-wasp I have had emerge in March, April and May of

third year. Upon one occasion from galls collected in September two *collaris* emerged in the following April of second year. Such an exceptionally early emergence has not I believe been previously recorded. Synergi I have had emerge in April of second year.

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(2) DALLA TORRE, K. W., and KIEFFER, J. J. (1910).—*Das Tierreich,* Cynipidae.
(3) ROSS, H., and HEDICKE, H. (1927).—*Die Pflanzengallen, Mittel- und Nordeuropas.*
(4) NIBLETT, M. (1939).—*Entomologist.*
(5) RIEDEL, M. (1910).—*Gallen und Gallwespen.*
(6) ADLER, H., and STRATON, C. R. (1894).—*Alternating Generations.*

10, Greenway,
Wallington, Surrey.

NOTES AND OBSERVATIONS.

NEW SUBSCRIPTION RATE.—Readers will notice, with regret no doubt, that the subscription rate has been raised, starting with this issue, to 15*s.* per annum. This is unfortunately unavoidable if the magazine is to continue as heretofore, and is due entirely to increases in the costs of printing, publishing and distribution. It is hoped that our supporters will bear this minor affliction with fortitude and send me their subscriptions as soon as they can.—N. D. RILEY.

THE SOCIETY FOR BRITISH ENTOMOLOGY.—Owing to enemy action almost the whole of the archives of this Society and practically the whole of the stock of back numbers of transactions and journal have been completely destroyed, including the current list of the names and addresses of the members. Any members of the Society who happen to see this notice would facilitate matters very materially for the officials of the Society if they would be good enough to communicate their present addresses to: W. PARKINSON CURTIS, 17, Christchurch Road, Bournemouth.

EARLY DATES.—On May 27 of this year while collecting in a wood in Sussex I caught a specimen of *Melitaea athalia* freshly emerged. On June 9, collecting on the Chiltern Hills with a friend, he caught a worn male *Lysandra coridon.* I should be very interested to know whether there are any records of either of these two having been caught on such unusually early dates.—ARTHUR VALENTINE; 24, Auriol Road, W. 14.

POSSIBLE SECOND BROOD ERYNNIS TAGES.—On August 5 last at Dorking, Surrey, I captured a freshly emerged individual of *Erynnis tages.* I now possess nine specimens of this butterfly, all of which have been captured by me in the month of August during the past few years.—A. A. W. BUCKSTONE; 90, Pams Way, Ewell, Surrey.

ANOTHER PLAGUE OF PIERIS BRASSICAE.—In the autumn of 1939 many people drew attention to the damage done to vegetable gardens

by the enormous quantities of larvae of *P. brassicae*, and a correspondent asked me to try and discover whether many of these larvae were "stung." I did not have time to make any investigations. So bad was the damage that people have been drawing attention in the *Western Mail* to the abnormal number of White butterflies about. One person wrote and said that he had killed 270 in his house! I thought this must be a yarn, but the statement was more or less corroborated by an entomological friend of mine who said that "his rooms at his farm were full of white butterflies." So evidently the myriads of larvae of last year crawled into houses and up walls in order to become chrysalides, and very few can have been "stung." Also, although we had 7 degrees below zero of frost here one night, they survived even that.—(Brig.-Gen.) B. TULLOCH; Hill Crest, Abergavenny, June 16, 1940.

MOTHS AT HEADS OF PHRAGMITES.—While dusking near a local river early last September in company with Mr. R. C. Pitman, I was surprised to find moths swarming to the flower-heads of the Common Reed. It was possible to secure a large number at every sweep of the net. *Leucania pallens* seemed the commonest species, but there was a good assortment, including many *Amathes c-nigrum*, *Agrotis segetum*, *Peridroma porphyrea*, *A. ipsilon*, also *Gortyna flavago* and *Hydroecia micacea*. I have not seen any recent mention of this form of attraction.—C. G. M. DE WORMS; Salisbury, September, 1940.

IMMIGRANT LEPIDOPTERA IN THE INNER AND OUTER HEBRIDES IN 1940.—My experiences with wandering insects in the Hebrides began in Coll on May 27 with *Plusia gamma*, which appeared in some numbers. It was, however, not accompanied by other immigrants. On Tiree on June 4 the same insect became equally abundant, followed on the following day by swarms of *Pieris brassicae*, *Vanessa atalanta* and *V. cardui*, the first two being particularly plentiful in the Ruaig-Caolas area. Next day, on the Isle of Gunna, all three, as well as *Plusia gamma*, occurred in very small numbers. Later in the year, in the second week of August, *V. atalanta* turned up on Coll. Upon the same island, in the same month, larvae of *Plutella maculipennis* became a terrible pest to cabbage crops.

In the Outer Isles, *Plusia gamma* was observed in South Uist on August 25 when larvae of *Pieris brassicae*, the progeny of May–June immigrants, were proving very destructive in the Stoneybridge area. On August 23 *Plusia gamma* flew in sparse numbers on Benbecula, as did the butterflies *Vanessa atalanta* and *V. cardui*.—J. W. HESLOP HARRISON.

CALLIMORPHA JACOBAEAE L. LARVA FEEDING ON COLTSFOOT (TUSSILAGO FARFARA L.).—Tutt (*Hints for the Field Lepidopterist*, vol. ii, p. 113) says the larva of *Euchelia jacobaeae* will feed on coltsfoot and groundsel as well as ragwort (*Senecio jacobaeae*). This second volume of *Hints* was printed in October, 1902, so some time before Scorer's *Log-book*, which Mr. Benson gives as 1912, although my copy, perhaps a later edition, is dated 1913. Tutt gave no

collector's or writer's name after this hint, as he does at other times; he also does not say a word about the Coltsfoot being only a confinement food, as Scorer does. Whenever I have seen *C. jacobaeae* here in Upton, Notts, it has nearly always been in or near gardens that have had some groundsel (*Senecio vulgaris*) in them. I have never seen the larvae at Upton; although there is Ragwort here I have never seen them on it. On the Lincolnshire limestone I have seen it and bred it from Ragwort-fed larvae. On looking over that well of hidden facts the back numbers of the *Entomologist*, as far as I have them, I find that *jacobaeae* larvae feed mostly on Compositae and mostly on the flowers, e.g. Groundsel (*S. vulgaris*, *Entom.*, 1935, **68** : 188), *Senecio greyi* (*Entom.*, **70** : 20), *Senecio crucifolius* (*Entom.*, **70**, 886), Ox-eye Daisy (*Chrysanthemum leucanthemum*, **69** : 240), and Yarrow (*Achillea millefolium*, **69** : 240). Then there is a record from a different order of plants, namely one feeding on hop (Urticaceae, *Humulus lupulus* L., **69** : 70). No doubt if anyone took the trouble to look further back than I did in the *Entomologist* they would find perhaps more and more varied foods.—A. S. B. F. P. WYNNE; Upton House, Upton, nr. Newark, Notts.

APATELE EUPHORBIAE SCHIFF. ON THE ISLE OF COLL.—Hitherto we have only encountered this insect on the Isles of Raasay, South Rona and Fladday, where it was uniformly noted as feeding on birch, sallow and heather. Last season (1939) and during the present (1940), the larvae were captured on Coll feeding in this case on *Myrica gale*, the plant to which it owed the specific name "*myricae*" employed by former generations of entomologists.—J. W. HESLOP HARRISON.

TRIPHAENA PRONUBA ATTACKED BY SPARROW.—On August 11, at Taplow, about 2.30 p.m., my attention was attracted by what I first took to be a fluttering yellow leaf, but which I soon saw to be a specimen of the common Yellow Underwing moth (*Triphaena pronuba*), which was apparently trying to fly, but having some difficulty in raising itself from the ground. At the same time I noticed a sparrow, a few yards away, watching the moth with evident interest, and hopping gradually closer to it. Possibly the bird, like myself, was at first doubtful whether the moth were an insect or a leaf. At length the moth got fairly into the air, and the sparrow at once made a dash straight at it, but, as far as I could see, turned away suddenly just before reaching it. The moth continued its flight, slowly, heavily and clumsily, and the sparrow could easily have caught it had it so desired, but appeared to take no further interest.—LAWRENCE J. TREMAYNE; Grand Buildings, Trafalgar Square, London, W.C. 2, September 18, 1940.

ABUNDANCE OF LARVAE OF APAMEA UNANIMIS.—On the evening of September 30 Mr. R. C. Pitman and myself visited a local river bank in search of *Rhizedra lutosa* which was not forthcoming. In spite of cold conditions we were amazed to find larvae of *A. unanimis* in the greatest profusion feeding on the short stems of *Phragmites*.

We secured nearly a hundred in quite a small area. Several authors including South give the impression that the larvae undergo the normal hibernation, reappearing in the spring to complete their feeding up. Mr. Pitman, who has bred this species, says that the larvae are full-fed in the autumn and then go down for a resting period throughout the winter, only pupating in the early spring, rather after the fashion of *Agrotis ripae*.—C. G. M. DE WORMS; 12, Harcourt Terrace, Salisbury, October, 1940.

AN IRREGULAR COUPLING.—On May 25 last I was proceeding from Fetcham by way of Cock Lane to Bookham Common when I noticed a Tipulid in copulation on the trunk of an oak tree. My first impulse was to leave the insects alone, but it then occurred to me that possibly Mr. Parmenter might like to have them for local records, so I attempted to tube them. They flew off, the Tipulid carrying the other fly. They settled a few yards away, where I managed to take hold of the Tipulid with my left hand and lifted both flies and dropped them into a glass tube. At that moment another insect attracted my attention, so without taking any further notice of the pair I put the tube away and shut up the case. I opened the latter some fifteen minutes later for another capture and saw the two insects apparently breaking away from each other. The next time I opened the case there was a "scrap" going on in the tube. When I got home at midday the Tipulid was dead and the other fly was trying to drive its proboscis into the thorax of its victim. A whiff of chloroform settled it and then I noticed that the flies were different species and also that both were males. I had not paid any attention to the manner in which they were attached, but it was firm enough to enable the Tipulid to carry the other fly from the tree and also to hold when I picked the Tipulid up by the wings, and it lasted for at least a quarter of an hour after I had found them.

Mr. L. Parmenter has kindly named the two flies for me, *Tipula vernalis* Mg. and *Empis tessellata* F., a "Robber" fly, and has confirmed the sex. He has the specimens in his collection.—H. J. BURKILL, M.A.; "Brincliffe," The Mount, Fetcham, Leatherhead, July 11, 1940.

RECENT LITERATURE.

British Water Beetles. Vol. I. By F. BALFOUR-BROWNE. Ray Society Publication No. 127. Pp. xix + 375. 89 Text-figures, 5 plates. 8vo. 1940.

As stated in the Preface of this volume this is not a systematic treatise on the British water beetles, but the volume, which covers up to the end of the Hydroporinae, deals principally with the habits as observed by the author, and the distribution as ascertained by 36 years of collecting and from lists sent by correspondents. Much of the information included, principally on distribution problems, is extremely interesting, and is rendered more valuable by

the provision of a map on the Watson-Preager system for all but the universally distributed species.

Although this volume is not a systematic treatise the most important differences between related species are fully described, frequently with the aid of very clear figures, and useful keys are included for the species. One noteworthy feature of the work is the frequency of the statement, " nothing is known of the life-history." This serves to draw attention to the remarkably wide field of study that remains to be dealt with in the rather neglected groups of water-beetles. Apart from the initial works of Schiodte and Meinert, only one major study of the larvae of Hydradephaga has been published, by Bertrand, and these leave the greater part of the British fauna untouched. Considering the ease with which the majority of small species can be kept in tumbler aquaria the present gap in our knowledge has little justification, and it is to be hoped that the realization of this may lead to increased researches in this interesting field.

One fundamental rearrangement of the classification of the Dytiscidae is made by the division into only two subfamilies, Noterinae and Dytiscinae, and by the reduction in the status of Laccophilinae, Hydroporinae, Colymbetinae and Dytiscinae to Tribes. Some such rearrangement of the group had become essential since the appreciation that the Noterines are of higher status *vis-à-vis* the other groups than that commonly accorded them. Whether this is the most satisfactory arrangement is open to argument, and there is much to be said for the view, based on larval characters, that their treatment as distinct families is more natural. This would appear to involve the creation of a superfamily, Dytiscoidea, equivalent to the Caraboidea and Gyrinoidea, the latter already proposed by Ochs. The author has, however, not gone into the higher classification of the group, beyond stating the views previously expressed and suggesting the polyphyletic origin of the Dytiscidae.

OBITUARY.

Dr. F. W. Edwards, F.R.S.

(Plate I.)

The sudden and unexpected death of Frederick Wallace Edwards on November 15, 1940, after a relatively short illness and an operation, removes from the ranks of entomologists the world's foremost expert in the systematics of the Culicidae (Mosquitoes) and one of the leaders in the general systematics of the Diptera, particularly Nematocera. The British Museum (Natural History) loses a member of its staff who has probably been its most prolific worker since its separation from the British Museum at Bloomsbury, and a large number of people, including professional systematists, field entomologists, malariologists and amateur entomologists, lose the help and friendship of a man whose character, steadfast devotion to his work and readiness to help others were an inspiration to those with whom he came into contact, though few could hope to emulate him.

Edwards was born on November 28, 1888, at Fletton, Peterborough, his father being the late C. L. Edwards of that town. His interest in matters entomological seems to have been aroused through the influence of his mother at the very early age of four. Schooled at the Cambridge and County School for Boys he there took an active part in the proceedings of the School Natural History Society, and in 1904 he was awarded a special school prize for a collection of "Micros."

He went to Cambridge in 1906 and entered Christ's College with the late Sir Arthur Shipley as his tutor. He took Natural Science Tripos and was admitted to the Degree of B.A. in 1909. While at the University Edwards spent a great deal of his spare time in the Zoology Museum working with the late Dr. David Sharp. In 1910 he took the Cambridge University Diploma in Agriculture, and in November of that same year he was appointed to a vacancy in the Entomological section of the Zoology Department of the British Museum (Natural History). Once in the Museum—and it seems that in being appointed there he had achieved the ambition of his youth—he started to work on the Diptera, a section of the collections then steadily expanding under the influence of the late E. E. Austen. Austen was drawn to such Diptera as could be examined with the aid of the hand-lens, and he disliked groups where species were differentiated by characters exhibited by one sex only. The ever-growing importance of the mosquitoes and the existence of the collections formed by the late F. V. Theobald when he was preparing his great monograph brought a constant flow of correspondence to the Museum about this group, and these various factors, apart from any natural inclination, directed Edwards's attention towards the Nematocerous Diptera and the Culicidae in particular.

Edwards was a man of considerable fixity of purpose and of great determination in the observance of the very high moral standards that he set himself. During the Great War of 1914–1918, coming as it did regrettably early in his career, he refused to do military service, and as a result of this he had to forego his entomological studies for agricultural labour for a period. The fact that certain of his colleagues and superiors in the Museum were most unsympathetic in this matter at the time, and indeed for a considerable time afterwards, may have been partially responsible for the depth to which Edwards sank himself in his work and isolated himself, to a certain extent, from his colleagues unless the latter, as individuals, made a definite approach towards him.

In the field Edwards was an assiduous collector. He made two major collecting expeditions, the one to the Argentine and Chile in 1926, the other to East Africa in 1934. The reports on the Diptera of Patagonia and South Chile containing the results of the first run to 2071 pages, with one volume of the series of seven still unpublished; the reports on the latter are still far from complete and already run to 579 pages. He was a keen collector of British Diptera and had a most uncanny knack of being able to "spot" rarities, "new records" and even new species of such minute insects as gnats and midges

while they flew or rested on a tree trunk or other object. He was devoted to the open-air life and used to spend his holidays camping, with his bicycle as means of transport. His wife used to accompany him on most of these collecting holidays, and she was his companion on the expedition to the Argentine and Chile from which Edwards brought back over 20,000 specimens, which included representatives of over 700 new species.

Papers published by Edwards run to over 350 titles and a great many of these are of a considerable length; he was not given to writing brief notes of new records and the like. His works probably exceed 6000 pages of print, with well over 2000 of his own original drawings. His intensive studies on the Culicidae occupy a very large part of his total output of papers, but there was hardly any group of the Nematocerous Diptera on which he had not published. His papers on the British representatives of these flies are well known to British Dipterists, who regard them as absolutely indispensable. In the course of his career he described over 2000 new species, quite a few of them British, and his additions to the British List as the result of his own collecting are some 500. His influence in the groups in which he was particularly interested was far greater than the mere bulk of his published work indicates. It can be detected in papers emanating in diverse languages from many parts of the globe. Edwards led, others, gratefully, followed.

Cambridge admitted Edwards to the degree of M.A. in 1925 and to the degree of Sc.D. in 1931. In 1938 he was elected a member of the Royal Society. To his colleagues it appeared that, at the time of his death, he was at the height of his powers with many years of ever more fruitful work in front of him. In many ways it is to be regretted that Edwards was not in a position to act as a teacher. Students are, of course, welcomed at the Museum but, since it is not a teaching institution and since none of its staff, who are civil servants, are recognized teachers in the University sense, full-time research students, working for a considerable period of time under a pre-eminent man like Edwards, are not to be found within its walls. Of visitors Edwards had plenty but, while visitors can be helped, it is only the full-time student who, working in the close relationship of student and teacher for a considerable period of time, can really absorb some of the knowledge of which a man like Edwards had such a store, but which is of such a nature that it cannot be translated into the printed word. This knowledge has vanished and its loss is grievous.

Edwards had no private collection, and in consequence of this most of his types and " new record " specimens are in the British Museum (Natural History). When the material upon which he was working was already the property of some other institution, he was usually most careful to make arrangements to retain duplicate material in the Museum whenever this was possible.

Edwards is survived by his wife and three daughters, and all entomologists from many countries who came into contact with him will extend their sympathy to them. JOHN SMART.

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SPECIFIC NAMES IN THE EREBIAS, AND OTHERS, WITH A PROTEST.

BY GEORGE WHEELER.

I HAVE only just found time to give an adequate answer to Mr. Warren's strictures on my paper in the *Ent. Rec.* with regard to his use of certain names in the Erebias. He says that he fails to understand why I did not find the names I referred to in the index. The reason (which I thought was made plain in the original paper) is that I was looking for names of *species*, and therefore expected to find them in the list of species dealt with (i.e. pp. 391–399), and these names do not occur as specific names at all.

With regard to de Prunner's names I had certainly not realized that what in everyone else's descriptions meant fore wings upperside meant in his hind wings underside, and *vice versa*. It was most ingenious of Dr. Verity to discover that sense could be made out of his descriptions by turning them upside down and inside out, as they were quite unintelligible, or, as Mr. Warren puts it, nonsense, on any ordinary rules of interpretation, and this had certainly not been recognized until comparatively lately, and his descriptions had consequently been generally disregarded—a fate which was thoroughly well deserved by anyone who affected such a form of description in contrast to that universally adopted. This, of course, makes Mr. Warren's use of the names quite intelligible, though with a view to being understood, it would have been much better to have followed the former practice of disregarding them.

I am not surprised that Mr. Warren did not answer the rest of my paper, as it still seems to me entirely unanswerable. My main contention—that the reason for anything having a name at all is that people may understand what object is spoken or written of—is surely axiomatic. It is as hopeless to argue with anyone who denies it as to argue with anyone who denies that 2 and 2 make 4, or insists that two straight lines can enclose a space. My other contention, that the greatest possible hindrance to fixity of nomenclature is unrestricted priority is surely self-evident, though so constantly denied, since still older names may at any time be dug out. It must be remembered that the earliest names do not always occur in strictly entomological publications, nor even in papers devoted to natural history, and so are only discovered by accident.

What stronger proof could be found of the instability of names under the priority rule than Mr. Warren's change of eight universally accepted names in this one genus ? How in the face of this contradiction he can maintain that the use of " the code " has been " the first real step towards stability of nomenclature " is his own secret. He goes on to speak of the value of a great volume of work done under the code. Undoubtedly such has been done, and it is most unfortunate that its nomenclature makes so much of it unintelligible to the great majority of entomologists. He does not seem to realize that all the same work could have been done, and moreover been generally intelligible, if the " generally accepted " names had been used as the specific names from which to start. There is, and can be, nothing scientific about a specific name as such; most of such names are a sufficient proof in themselves, though some may be descriptive, and it is difficult to understand how any argument can be based upon any scientific value attached to them. (Generic names are in a different category, because here nomenclature trespasses on the province of classification, though it need not do so, as I pointed out at the International Congress in 1912.) Whatever the origin of generally accepted names may have been, they are those which enable people to know what others are speaking or writing about, and to go back to others is deliberately to contradict the very purpose for which names were given at all.

I went on to show how easily all confusion might have been avoided, and absolute fixity of nomenclature secured by two simple modifications of the priority rule. What to me is so " incredible " is that anyone should fail to see the cogency of these arguments.

A short parable will clinch the matter by a *reductio ad absurdum*. The subject is provided for me by the accident that not one of my sisters-in-law was known by her first name, and the form shall be a conversation between a priority-fan and myself.

The P.F. : How's Frances ?

I (puzzled) : Frances ? What Frances ?

The P.F. : Why, your sister-in-law of course.

I : But I haven't got—oh, do you mean Gertrude ?

The P.F. : You mustn't call her that, you must say Frances.

I : Why on earth should I ?

The P.F. (severely) : It was the first name given her, and by the sacred law of priority must be the one used.

I : But everybody knows her as Gertrude.

The P.F. : What of that ? The mistake must not be continued just because everybody accepts it.

I : But if I say Frances, nobody will know what I mean.

The P.F. (tartly) : What does that matter ? The rule must be kept.

Here the conversation ends, but everybody goes on saying Gertrude, except a few very superior people.

The application of the parable is obvious.

The mere substitution of one name for another, however unintelligible it may make the information intended to be conveyed, does not necessarily create any confusion, but the matter is quite different when a name is switched off from one species to which it is universally applied on to another (e.g. *pheretes* transferred to *orbitulus*). A glaring instance of this occurs in Dr. Verity's recent paper, where he reverts to Aurivillius' use of *parthenie* for *aurelia*, and *parthenoides* for *parthenie*. Dr. Verity himself is, of course, perfectly intelligible, because on every page where the name occurs he reminds us that when he says *parthenie* he means *aurelia*; the change (like all such changes) depends on the fact that somebody has supposed that the original description fits some other species better than the one to which it is universally referred. I mentioned the way in which Aurivillius uses these names many years ago (*Entom.*, **41** : 149), but Aurivillius was not followed in this matter until just recently. (He does not even use them as specific names, but as forms of *athalia*.) The trustful belief that entomologists will generally give in to this change over is, I fancy, " wishful thinking," but if they do, think how unintelligible all that has been written about *parthenie* must necessarily become to future readers. But intelligibility appears to be a matter of no importance to these good people, provided their beloved priority is preserved, whereas my contention is that intelligibility being the primary use of a name matters far more than any theory whatever, and that the fact that a name is generally accepted is the best possible reason for retaining it. Of what possible scientific value can it be that somebody had previously called it something else ?

I think my record for the last forty years will show that I am not so futile or so ignorant as might be inferred from Mr. Warren's paper. Anyhow, I have said my say and do not intend to write further on the subject, so anyone else is welcome to the last word if so desired.

Worthing;
December 3, 1940.

MELITAEA (EUPHYDRYAS) AURINIA.—In the *Entomologist*, 1940, p. 253, Mr. J. Antony Thompson records the finding of the larvae of *Melitaea aurinia* in Snowdonia at an elevation of 750 ft., and inquires if this is the highest altitude for *aurinia* in Great Britain. I take this species of Fritillary on the Bourton Downs in the Cotswolds at a height of 800 ft. In Ireland I have seen and secured it on Mount Gabriel, Co. Cork, at an elevation of 1300 ft.—C. DONOVAN, Lt.-Col. I.M.S. (retired); Bourton-on-the-Water, Glos, November 17, 1940.

RECORDS OF A NEW FOREST MOTH TRAP.

By C. W. Mackworth-Praed, F.R.E.S., F.R.G.S., M.B.O.U.

(*Concluded from p.* 12.)

Geometridae.

Ourapteryx sambucaria, 2/7 to 4/7; very common.
Epione repandaria, 3/8 to 3/9.
Opisthograptis luteolata, 3/4 to 3/9; probably three overlapping broods, but commonest mid-May and mid-August.
Campaea margaritata, 3/6 to 3/7.
Ellopia fasciaria, 3/6 to 3/7.
Plagodis dolabraria, 4/5 to 3/7.
Selenia bilunaria, 4/3 to 4/5, 3/7 to 1/9.
S. lunaria, 3/7 to 3/8.
S. tetralunaria, 3/4 to 4/4, 3/7 to 1/8.
Gonodontis bidentata, 4/4 to 3/6.
Crocallis elinguaria, 3/7 to 4/8.
Deuteronomos alniaria, 4/7 to 3/9.
D. fuscantaria, 1/8 to 3/9.
D. erosaria, 3/7 to 3/9; in great profusion each year.
Ennomos quercinaria, 1/8; very rare in trap!
Colotois pennaria, 3/10 to 1/11.
Phigalia pedaria, 4/1 to 4/2.
Apocheima hispidaria, 2/3 to 1/4.
Lycia hirtaria, 4/3 to 4/4.
Biston strataria, 2/3 to 4/4.
B. betularia, 1/6 to 3/8; both forms, most abundant early June and early August.
Hemerophila abruptaria, 4/4 to 2/5.
Cleora lichenaria, 3/6 to 1/8.
C. jubata, 1/8.
C. repandata, 3/6 to 4/8.
B. punctinalis, 1/6 to 3/6.
C. rhomboidaria, 3/6 to 4/8.
C. cinctaria, 2/4 to 4/5.
Boarmia roboraria, 3/6 to 3/7.
Ectropis crepuscularia, 4/3 to 4/5, 4/6 to 1/8.
E. consonaria, 4/4 to 1/5.
E. extersaria, 1/6 to 1/7.
Pseudoterpna pruinata, 2/7 to 3/8.
Hipparchus papilionaria, 2/7 to 1/8.
Comibaena pustulata, 1/7 and 2/7.
Iodis lactearia, 2/6 to 2/7.
Hemithea aestivaria, 4/6 to 3/8.
Cosymbia pendularia, 1/8.
C. porata, 1/5 to 3/6; also 3/8.
C. punctaria, 1/6 to 3/6, 1/8 to 3/8.
C. orbicularia, 4/7 to 1/8.
C. linearia, 3/6.

Asthena albulata, 4/5 to 3/8; broods overlap.
Euchaeca nebulata, 4/6 to 2/7. *Sterra seriata*, 3/6 to 1/8.
Sterrha bisetata, 2/7 to 3/8. *S. dimidiata*, 2/7.
S. trigeminata, 1/6 to 3/7. *S. aversata*, 4/6 to 4/8.
S. subsericeata, 1/6 to 3/7. *S. inornata*, 4/7 to 1/8.
S. muricata, 2/7 to 1/8. *S. sylvestrata*, 2/7 to 4/7.
Scopula floslactata, 4/5 to 1/7. *S. immutata*, 1/6 to 3/7.
S. marginepunctata, 2/4 to 4/5, 4/7 to 1/9.
S. imitaria, 2/7 to 4/7.
Calothysanis amata, 4/5 to 3/6, 3/7 to 3/9.
Cabera pusaria, 4/5 to 4/6, 1/7 to 4/8; broods overlap.
C. exanthemata, 3/4 to 4/6, 1/7 to 2/9; broods overlap.
Bapta temerata, 1/6 to 2/6.
B. bimaculata, 3/5 to 4/5.
Semiothisa alternata, 3/6 to 4/8.
S. notata, 2/7 to 3/7. *Chiasmia clathrata*, 4/7.
S. liturata, 2/7 to 3/7. *Lithina chlorosata*, 4/4 to 3/6.
Bupalis piniaria, 1/7, ♀♀ only.
Dyscia fagaria, 1/5 to 3/6.
Perconia strigillaria, 3/6 to 1/7.
Ligdia adustata, 3/8.
Lomaspilis marginata, 4/5 to 3/8.
Pachycnema hippocastanaria, 2/2 to 1/6, 2/7 to 3/8; possibly three broods.
Theria rupicapraria, 2/2 to 2/3.
Erannis leucophaearia, 3/1 to 4/2.
E. aurantiaria, 3/11. *E. marginaria*, 3/2 to 4/4.
E. defoliaria, 4/10 to 3/1. *Alsophila aescularia*, 3/3 to 3/4.
Operophtera brumata, 1/12 to 2/2; accidental visitor in trap only.
O. fagata, 2/1.
Oporinia dilutata, 3/10 to 1/11.
O. autumnata, 4/10 to 1/12.
Colostygia multistrigaria, 3/3 to 3/4.
C. pectinataria, 4/5 to 4/6.
Perizoma alchemillata, 3/7 to 1/8.
P. flavofasciata, 1/6 to 1/8.
Eupithecia pulchellata, 2/5 to 4/6, 3/7 to 1/8.
E. centaureata, 4/5 to 3/6, 1/8 to 4/8.
E. haworthiata, 3/7 to 3/8. *E. denotata*, 3/7.
E. castigata, 3/6. *E. icterata* f. *subfulvata*, 1/8.
E. irriguata, 4/4.
E. nanata, 4/4 to 1/7, 3/7 to 3/9.
E. vulgata, 4/5 to 1/7, 3/7 to 1/8.
E. tripunctaria, 2/5 and 2/8. *E. abbreviata*, 4/3 to 2/5, 1/7.
E. goossensiata, 4/7 to 1/9. *E. dodoneata*, 3/4.
E. lariciata, 3/6. *E. sobrinata*, 1/7 to 2/8.
Gymnoscelis pumilata, 3/4 to 4/6, 1/7 to 3/9.
Chloroclystis coronata, 3/6 to 4/7.
C. rectangulata, 3/6 to 2/7.

Lobophora halterata, 4/5 to 2/7.
Acasis viretata, 2/5.
Mysticoptera sexalisata, 2/6 to 4/7.
Nothopteryx carpinata, 4/3 to 1/5.
Thera firmata, 2/9 to 3/9.
T. obeliscata, 3/5 to 3/6, 1/9 to 3/10.
Hydriomena coerulata, 1/8 to 3/8.
H. furcata, 1/6, 1/7 to 1/9.
Lyncometra ocellata, 4/5 to 4/6, 2/7 to 2/9.
Mesoleuca albicillata, 2/7.
Euphyia unangulata, 1/6 to 1/9 ; probably two broods.
E. bilineata, 4/7 ; only one occurrence in five years!
Epirrhoë alternata, 1/6, 1/7 to 4/8.
E. rivata, 3/8.
Xanthorhoë fluctuata, 1/4 to 1/6, 1/7 to 1/9 ; curiously rare in trap.
X. montanata, 1/6 to 3/6 ; again a rare moth in the trap.
X. designata, 1/6 to 4/6, 1/7 to 2/9 ; broods overlap.
X. spadicearia, 1/5 to 3/6, 3/7 to 4/8.
X. ferrugata, 3/5 to 3/6, 3/7 to 4/8.
Earophila badiata, 2/3 to 2/5.
Coenotephria derivata, 2/4 to 3/5.
Nyctosia obstipata, 3/6.
Horisme tersata, 4/7.
H. vitalbata, 1/8.
Orthonama lignata, 3/8.
Calocalpe undulata, 3/6 to 4/7.
Philerome vetulata, 4/7.
Dysstroma truncata, 1/6 to 4/6, 1/8 to 3/9.
D. citrata, 4/7 to 2/10.
Electrophaës corylata, 1/6 to 3/6.
Ecliptopera silaceata, 1/6 to 2/6, 4/7 to 3/8.
Lygris testata, 4/7 to 3/8.
L. populata, 1/7.
Cidaria fulvata, 4/6 to 2/7.
Chloroclysta siterata, 3/10.
Larentia clavaria, 2/10.
Ortholitha mucronata, 3/6 to 4/6, 2/7 to 3/8.
O. chenopodiata, 4/7 to 1/8, 1935 only!
Anaitis plagiata, 3/6, 3/8 to 2/9.
Chesias legatella, 2/10 to 3/10.

Pyralidae.*

Synaphe angustalis, 3/6 to 3/7.
Pyralis costalis, 4/6 to 3/9.
P. glaucinalis, 2/7 to 3/8.
Nomophila noctuella, 1/6 to 1/7, 3/7 to 3/9.
Rhodaria ostrinalis, 2/7 to 4/8.
R. aurata, 1/7 to 4/8.
R. cespitalis, 3/7.
Endritricha flammealis, 1/7 to 3/8.
Eurrypara hortulata, 1/8 to 2/8.
Hapalia prunalis, 3/6 to 1/8.
H. olivalis, 3/6 to 2/7.
Anania verbascalis, 3/7 to 3/8.
H. lutealis, 3/8.
H. ferrugalis, 1/6, 1/8 to 3/8.

* Names according to Pierce and Metcalfe, *Genitalia Pyrales*, 1938.

Mesographe forficalis, 4/5 to 3/6, 1/8 to 3/9.
Perinephela lancealis, 3/6 to 3/7. *Loxostege verticalis*, 3/7 to 2/9.
P. sambucalis, 2/6 to 3/8. *Evergestis extimalis*, 3/6.
P. fuscalis, 1/7 to 3/8.
Nymphula stratiotata, 4/7 to 1/8.
N. nymphaeata, 1/7.

SESIIDAE.

Aegeria vespiformis, a single somewhat surprising occurrence, 3/8, 1939.

HEPIALIDAE.

Hepialus lupulinus, 2/7. *H. humuli*, 2/6 to 4/6.

51, Onslow Gardens, S.W. 7.

Note.—By an unfortunate error of mine in re-drawing the diagram of the trap (p. 7) for reproduction, the lower rubber pad on the door C is shown on the wrong side. It should be on the left.—ED.

APATELE ALNI IN YORKSHIRE.—Quite by chance I found an almost full-fed larva of *Apatele alni* in mid-August, 1940. It was resting on a leaf of a solitary hedge-side alder in bright sunshine, and after capture fed for a couple of days before entering a piece of elder stem for pupation. Although I have long suspected that this species occurred near Doncaster, this is my first definite record. The late Dr. H. H. Corbett, who collected in the area for many years, told me that he had never found *A. alni* in S. Yorks, but in Porritt's list of Yorkshire Lepidoptera Edlington Wood is mentioned as a locality where the writer found a larva on oak on August 5, 1882. I may add that although industrial development has altered matters in recent years, Edlington Wood is still sufficiently unspoiled for many interesting species of Lepidoptera that still occur there.

I was interested in Prof. J. W. Heslop Harrison's remarks about *Nymphalis io* in Durham and Northumberland, and can say that this butterfly has undoubtedly increased in parts of S. Yorks during the last few years. I saw large numbers of larvae last July, and examples of the butterfly sometimes visit my own garden, which is fairly close to the town. Not long ago I considered the species a rarity here. Mr. B. H. Crabtree informs me that larvae of *N. io* were very numerous in parts of Cheshire last summer, and he adds that the species has increased considerably in that county. Larvae of *Vanessa atalanta* were abundant near Doncaster in August, and I found most of them on young nettles that had grown up after the older plants were destroyed in June. I expected large numbers of imagines in September, but they appeared only in medium strength. The larvae collected and reared proved healthy and free from parasites, and probably the cold weather of mid-September had a bad influence at the time the butterflies were due to emerge.—GEORGE E. HYDE; 20, Woodhouse Road, Doncaster.

MASS MOVEMENT OF *PIERIS BRASSICAE* AND *P. RAPAE*.

By Brig.-Gen. J. B. G. Tulloch, C.B., C.M.G.

The year 1940 was remarkable in many ways. It began with one of the most severe winters on record. This was followed by week after week of continuous winds from N.W., N., and N.E. This produced a series of closely following droughts. These droughts produced fine, clear weather. The weather helped to produce and keep alive more butterflies than I have ever seen in England during any previous summer. Cause and effect seem pretty clear. The severe winter killed off myriads of the small birds. I have never known so few permanent resident birds in my garden. Consequently eggs, pupae, and small caterpillars were practically untouched by tits, etc. Then came the dry sunny summer, and the " hatch out " of enormous quantities of butterflies. *Pararge megera* flew up and down a garden path in " strings " of three or four. *P. aegeria* came out in an apparently endless succession of broods, which once even overflowed into the vegetable garden. *Eumenis semele* was one day seen covering a buddleia in blossom. *Coenonympha pamphilus* produced two broods. *Argynnis cydippe* appeared in the garden, whilst *Polygonia c-album* was one of the commonest butterflies everywhere, and on October 21 several were still feasting on rotten apples. As for *Pieris brassicae* and *rapae* the only word to express their numbers is " myriads."

On July 14 I went up a narrow wooded ravine on the south side of the Sugar-loaf Mountain (1955 ft.) which lies three miles north-north-west of Abergavenny. After many days of N.W. winds the direction was now from the south. Temperature 65°, barometer 29.50. On reaching a clearing at 1000-ft. level I sat down to see what butterflies were about, and soon found that a mass movement of *P. brassicae* and *rapae* was in progress. All these insects were coming over a shoulder of the hill, 1300 ft., from the N.E. On arriving at the clearing the butterflies turned due south and went down the centre of the ravine, flying low over the scrub oaks. They passed at the rate of three or four to the minute, and rather lazily. This was at 3.30 p.m. In the stream came a solitary *Colias croceus*. Now this gave a clue to where the movements began. For ten miles north of the direction from which the " whites " were coming there is an endless succession of mountains and narrow valleys, covered at the top with bracken, and on the sides with thick undergrowth. There is no " cabbage white " territory there. But well east of the Black Mountains and the

Sugar Loaf, running from Abergavenny towards Hereford, there is a cultivated valley in which there are acres of market gardens and cabbages. Also in that valley and one and a half miles due east from where I saw *croceus* there is a rough field where it can be found, if at all. This field is at the 400-ft. level. It therefore seemed to me that the *brassicae*, *rapae* and the *croceus* had come out from the Abergavenny-Hereford valley, flown west and climbed 900 ft., then turned S.W. over the ridge, turned south again down the ravine and therefore back towards Abergavenny, again one and a half miles down the hillside.

After a while I followed the insects back to my house, which lies at the bottom of, and the entrance to the ravine. The stream continued over my garden walls and hedges, and straight over the house. Those that came to the house all appeared to pass up the same drain-pipe, so much so that I called to members of my household to come out and watch " butterflies trying to emulate cat-burglars "! After passing over the house or close by the sides, the insects went steadily on over a belt of trees down towards the town of Abergavenny. During the night what I had expected happened. The barometer dropped, rain began, and next day the wind was east, which all showed that a small cyclonic depression had passed to the south of Abergavenny. The day following the wind was back in the N.W.

On August 4 the same thing happened all over again. Barometer 29.70, falling; temperature 70°, inclined to be thundery. Wind south. This time I was at a point three miles south of Abergavenny. The movement was from the N.N.E. from the direction of cabbage fields, two miles away. The butterflies went over fields and woods as before. Insects passed at the rate of five or six a minute. No other butterflies were affected, the edges of the woods swarming with *Vanessa io* and *P. comma*. The movement was, in general, down the river Usk, the valley at the spot where I was being about one mile broad. In the first instance I mentioned, the narrow valley or ravine was about 400 yards across on an average. During the night the glass fell still further, and a small cyclonic disturbance passed north of Abergavenny. Two days later the wind had set in from the north, and all special movement had ceased. The result of the two mass movements as decribed was to leave the Abergavenny district alive with *brassicae* and *rapae*, and many gardens and allotments had their cabbage crops ruined. The former outnumbered the latter by 3 to 1. But during the whole of the summer the *brassicae* females have outnumbered the males by 4 to 1. I checked this many times quite easily because the lavender hedges and Buddleias in my garden were a seething mass of " white " butterflies, which made observation very easy.

What causes mass movements of butterflies? My own opinion, based on personal observation in several parts of the world, is that these so-called "migrations" are not migrations in the sense of bird and animal movements, which have to do with feeding or breeding, but are mass movements due to atmospheric disturbances. Notices are continually appearing in scientific publications regarding "migrations" of white or yellow butterflies. I fancy these are mostly reported because the colour makes the insects visible to any casual observer. People in this district who do not know one end of a butterfly from another, and knowing that I am interested in butterflies, often ask me why there are such swarms of "white" butterflies about. But Pierid butterflies are not the only ones that hatch out in great numbers simultaneously. Seitz says of *Danaus plexippus* (the Monarch): "The species is found, from Canada to Paraguay. . . . It has in N. America as many as four broods. . . . Sometimes it occurs in large swarms." What probably happens here is that there are big hatches out in succession, from north to south, or vice versa, according to the atmospheric conditions, and this very noticeable appearance of an easily seen insect in one place after another may be mistaken for a "migration."* In previous numbers of the *Entomologist* I have drawn attention to the effect of weather on butterflies, and one must remember that abroad weather is very constant in that big barometric rises and falls and atmospheric conditions occur at fixed periods, such as tornadoes in N. America, rainy seasons in the Amazon basin, "siroccos" and "gregales" in the Mediterranean, typhoons in China and Japan, cyclones south of the equator, and monsoons in India, etc.

The following instances will illustrate my meaning, and they are personal observations:

1. Locusts and butterflies falling from a calm, clear sky on to the deck of a steamer 30 miles south of Arabia after a tornado had come from the land and passed over the steamer.

2. Myriads of *Vanessa cardui* appearing at Hyères, France, after a sudden and complete change of weather.

3. Swarms of *cardui* at Deolali, India, just before the monsoon broke.

4. Butterflies of all kinds at Pachmari, Central India, all drifting the same way at the end of the monsoon.

5. *Crastia core* at Deolali in large numbers being blown against their will in one direction during the monsoon.

6. Hundreds of *Atella phalanta* going in a circle round an extinct volcano in Mauritius just before the arrival of a cyclone.

* An ingenious theory; but that *Danaus plexippus* migrates, in the true sense of the word, in North America is an established fact.—Ed.

7. Massing of dragonflies (typhoon flies according to the Chinese) just before a typhoon at Hong-Kong.

If people who report seeing "migrations" of butterflies would also report on coming or going atmospheric disturbances, then much light might be shed on these mass movements.

Hill Court,
Abergavenny;
November 15.

LATE DATE FOR PARARGE EGERIA.—On October 7 I saw near here a *Pararge egeria* in fine and, I believe, perfect condition. Weather cool, but sunny at intervals; the only other butterfly seen was a single *Pieris napi*. In the garden here several *Polygonia c-album* and *Vanessa atalanta* survived till October 17; *Lycaena phlaeas*, *Pieris rapae* (or *napi*), *Aglais urticae* till October 22—elevation about 600 ft.—H. G. ATTLEE; Kingham Hill, Kingham, Oxon.

EUPITHECIA LINARIATA IN DURHAM.—The late J. E. Robson, in his Catalogue of the Lepidoptera of Northumberland and Durham, was able to report this species from only two localities in our counties—Seaham Harbour, due to the late Mr. J. R. Johnson (*not* Mr. Sticks, as Robson states), and Hartlepool, where Gardner got it. Recently I have noted it abundantly both as larvae and imago in the Team Valley, North Durham. This year, early in July, I observed seven specimens, all females, on a fence barely a hundred yards from where I write this note.—J. W. HESLOP HARRISON; King's College, University of Durham, Newcastle-upon-Tyne.

EUROIS OCCULTA IN HAMPSHIRE.—On August 3 I took a rather worn *E. occulta* at sugar in my garden here. The "all clear" woke me about 1 a.m. (B.S.T.) so I thought I would have a last look round the trees! The moth is the typical grey form, perhaps a little paler. I believe there is only one previous record for this county. It may be of interest also to mention a fresh example of *Hyloicus pinastri* which I found on July 1 in Portland Dockyard on the wall outside the Chief Engineer's window. It is safe to assume that it had not been attracted by light.—R. A. JACKSON (Captain, Royal Navy); The Hermitage, Bishop's Waltham, Hampshire.

CORDULEGASTER BOLTONII IN WILTSHIRE.—Further to our note on the occurrence of *Agrion splendens* Harris in Wiltshire (*Entom.*, **73**: 240) a specimen of *Cordulegaster boltonii* Donovan seen on the wing above a roadside ditch near Ashton Keynes, Wiltshire, on June 5, 1940, would seem to be a new Odonata record for that county. The insect was not captured, but the large size and alternate black and yellow rings left us with no doubt as to its identity. We trust that the publication of this note will incite other observers in the district to watch out for the insect and verify its occurrence in the county.—KENNETH WILLIAMSON and W. S. COWIN; "Kenwood," Brunswick, Douglas, Isle of Man.

NEW ANTS FROM WAIGEU ISLAND, NEW GUINEA, AND THE SOLOMONS.

By Horace Donisthorpe, F.Z.S., F.R.E.S., etc.,
Department of Entomology, British Museum (Natural History).

Pheidole (Pheidolacanthinus) bifurcus n. sp.

♀. Reddish brown, thorax and gaster darker, mandibles chestnut red, antennae and legs brownish yellow, funiculus, articulations of joints of legs and tarsi lighter, masticatory border of mandibles, eyes and anterior border of head narrowly black. Body clothed with sparse moderately long outstanding yellow hairs. *Head* without mandibles as broad as long, subparallel, posterior angles rounded, posterior border deeply sinuate in middle; *mandibles* massive, very shining, *masticatory border* unarmed and with 4 punctures; *clypeus* notched in centre of anterior border, flat, smooth and shining with a small raised tubercle in middle; *frontal area* indistinct with a few small longitudinal striae at base; a deep smooth furrow extends from base of frontal area to the sinuation in posterior border of head dividing posterior portion of head into two lobes; there is also an indication of a curved transverse depression crossing from eye to eye similar to that in *singularis* Smith, but much less marked; the head is longitudinally striate; the striae break off towards base into faint network; *scrobes* shallow and broad at base, reaching considerably beyond eye, not striate longitudinally, faintly rugosely punctured with a transverse raised ridge or two; *eyes* small, but convex, situated at sides of head in front of the centre; *antennae* 12-jointed, moderate; *scapes* reaching about $\frac{2}{3}$ of length of head, 3-jointed club of *funiculus* large, long, last joint about as long as the two preceding taken together. *Thorax* shorter than head, smooth and shining except sides of epinotum which are obliquely striate; *pronotum* armed with two short sharp curved spines, projecting outwards and slightly downwards at apex; *mesonotum* with a small raised transverse ridge in centre; *epinotum* separated from mesonotum by a deep furrow, and armed with two short sharp divergent spines projecting upwards; *petiole* narrow with rather long peduncle, and narrow node rounded above; *post-petiole* transverse considerably broader than petiole, convex above and armed on each side with a short-pointed projection, or tooth. *Gaster* short oval, smooth and shining. *Long.* 4 mm.

This species is allied to *singularis* Smith, but differs in many important particulars. It is darker in colour, the transverse impression on head is much less evident, the lobes of the head are much more evenly rounded at sinuation in centre of posterior border, the striae or raised ridges on the head are considerably finer, not so close, and the interstices less deep. In *singularis* the posterior part of the head is much more rugose, the pronotum is longitudinally striate, and the post-petiole does not possess the projection at sides.

☿. *Head* oval, narrowed in front and behind, *posterior border* narrowly margined, and with sharp posterior angles; *mandibles*, long, curved, *masticatory border* armed with short fine teeth; *clypeus* smooth, shining, convex above, anterior border rounded; *frontal area* fairly distinct; *cheeks* longitudinally striate; *eyes* prominent, situated on sides of head before the middle; *antennae* long, *scape* extending beyond posterior border of head by about half its length. *Thorax* longer than head, slender, smooth and shining except at episternite of mesothorax and sides of epinotum, where it is closely covered with small raised tubercles. *Pronotum* with sides rounded not as broad as head, armed with two short projecting moderately divergent spines; *mesonotum* narrow with a short raised transverse ridge and a small tubercle on each side of the ridge; *suture* between mesonotum and epinotum deep, *epinotum* armed with two small divergent spines pointing slightly backwards and bifid at apex, the posterior fork being a little the longer; *petiole* narrow, *peduncle* long, *node* at apex small and rounded; *post-petiole* small, slightly narrowed in front, rounded above and at sides and broader than petiole. *Gaster* small smooth, shining, oval. *Long.* 2·5 mm.

Type in B.M. (N.H.). Described from six workers and one soldier taken by Miss L. E. Cheesman in Dutch New Guinea, Waigeu Island, Camp Nok, 2500 ft., April, 1938, nesting under bark. Tube 18.

Pheidole (Pheidolacanthinus) medioflava n. sp.

☿. Head and gaster jet black, the rest of the body bright yellow; the antennae are inclined to be a little darker, and the teeth of the mandibles brownish; whole body smooth and very shining.

Head round, posterior angles rounded, posterior border almost straight, very narrowly margined; *mandibles* with two small sharp teeth at apex, a shorter blunter one before middle, otherwise indefinitely dentate; *clypeus* narrow, transverse, convex, anterior border rounded; *frontal area* large but ill defined; *frontal carinae* long, pointed at apex, slightly sinuate anteriorly, and divergent at base; *antennae* moderate, *scape* extending very little beyond posterior border of head, *funiculus* with 1st joint longer than broad, broader than the following joints before the club, equal in length to the three following united; joints 3–7 transverse, 2 and 8 as long as broad, *club* very slightly longer than the rest of the funiculus, last joint not quite as long as the two preceding taken together; *eyes* prominent, situated a little before centre of sides of head. *Thorax* armed with four rather long curved divergent spines, those on the *pronotum* projecting forwards and outwards, those of the *epinotum* shorter and projecting backwards and slightly downwards; suture between *mesonotum* and epinotum indistinct; *petiole* narrow terminating in a raised round node; *post-petiole* slightly transverse, rounded, scarcely broader and not as high as node of petiole; *gaster* oblong. *Long.* 3 mm.

Type in B.M. (N.H.). Described from twelve workers taken by Miss Cheesman in Dutch New Guinea, Waigeu Island, Camp Nok, 2500 ft. Tube 21. In a nest inside of a log with very small entrance.

This species comes nearest to *P. flavothoracica* Viehmeyer, but is slightly larger, the head is rounder, the spines are considerably longer, and the gaster larger; the joints of the antennae slightly different, etc.

Pheidole (Pheidolacanthinus) quadrispinosa Smith.

Journ. Proc. Linn. Soc. Lond., Zool., 8 : 72, pl. iv, fig. 6 (1864), ♀ = *P. (P.) armata* Smith, *l.c.*, p. 75, pl. iv, fig. 8 (1864), ♂. Donisthorpe, *Ann. Mag. Nat. Hist., Zool.* (s. 2), 1 : 144 (1938).

Type locality, Salwaty, New Guinea.

♀. Dark brown; antennae, tarsi, and articulations of legs brownish yellow, mandibles red, all borders black; whole body covered with scattered yellow outstanding hairs.

Head broadest just before base, slightly narrowed anteriorly, *posterior border* straight when seen from above, *posterior angles* broadly rounded; *mandibles* massive, shining, with some small scattered punctures and four larger ones along the masticatory border, armed with two strong teeth at apex and a small bluntly pointed one before base; *clypeus* emarginate in middle of anterior border, flat and smooth anteriorly, with a narrow carina in centre and some longitudinal striae at base; *frontal area* not distinctly defined, rest of head including cheeks and sides strongly longitudinally striate; *antennal carinae* long, sharp, raised, divergent; *scrobes* deep; *ocelli* small, rather flat; *antennae* fairly long, 12-jointed, *scape* extending towards posterior border over about ¾ of head; 3-jointed *club* of *funiculus* large and well marked, last joint about equal to the two preceding taken together. *Thorax* massive, *pronotum* narrow, transverse, armed with two sharp, strong divergent spines, projecting outwards; *mesonotum* broad, flat, transverse, rounded at sides, above and below, strongly longitudinally striate; *suture* between mesonotum and metanotum fine but distinct; *metanotum* narrow, transverse, rather broadly longitudinally striate; *scutellum* transverse, somewhat convex, separated from metanotum by a row of deep oblong punctures finely longitudinally striate and punctate; *epinotum* armed with a pair of strong curved sharp spines pointing backwards, space between strongly transversely striate; *petiole* with not long peduncle, concave and transversely striate anteriorly, *node* narrow above with a raised tubercle on each side at apex, posterior surface flat, rather rugose; *post petiole* transverse considerably broader than petiole, rounded above, longitudinally striate and bluntly pointed on each side; *gaster* large oblong oval, truncate at base, rounded at sides, *first segment* long, finely circularly striate, other *segments* smooth and shining. *Long.* 7 mm.

♀ type in B.M. (N.H.). Described from a single deälated female, the queen mother of the colony, taken by Miss L. E.

Cheesman in Dutch New Guinea, Waigeu Island, Camp Nok, 2500 ft., May, 1938, in a nest in old beetle burrows under bark of a tree, with soldiers, workers, and males.

♂. Black to brownish black, legs and antennae lighter, mandibles dirty yellow, shining, whole body clothed with fine yellow outstanding hairs.

Head with eyes broader than long, covered with not very close fine raised ridges, interstices rugose; *posterior border* rounded; *posterior angles* projecting; *mandibles* weak, masticatory border armed with small fine teeth; *clypeus* with *frontal area* forming a triangle margined on each side, anterior border rounded, disc convex with a few fine raised ridges; *eyes* large, oval, prominent; *ocelli* moderate, situated on top of back of head; *antennae* 13-jointed, first joint of *funiculus* globular, second as broad as long, the rest longer than broad. *Thorax* narrowed in front and behind; *pronotum* narrow, transverse; *mesonotum* convex, prominent, rounded at sides, bluntly pointed anteriorly, almost straight posteriorly and finely margined, longitudinally striate with a narrow smooth space in centre; *mayrian furrows* absent; *parapsidal furrows* short and shallow, but distinct; *praescutellum* narrow, widely longitudinally striate; *scutellum* transverse, convex, smooth and shining on disc; *epinotum* transverse, finely striate, *declivity* abrupt; a projecting tubercle is present on each side of the *dorsal surface* just before declivity; *petiole* narrow, *peduncle* moderate; *node* narrow above, posterior surface flat; *postpetiole* broader than petiole, transverse, rounded at sides, finely longitudinally striate; *gaster* long oval, truncate at base, smooth and shining; *cerci* present; *stipes* large. *Long.* 4·3–5 mm. *Wings* dusky, iridescent, fringed with short fine brown hairs; *veins* and *pterostigma* dirty yellow; one *discoidal*, two *cubital*, and closed *radial cell* present.

♂ type in B.M. (N.H.). Described from a number of males taken by Miss L. E. Cheesman in Dutch New Guinea, Waigeu Island, Camp Nok, 2500 ft., May, 1938, in two colonies of this species.

Crematogaster (Orthocrema) major n. sp.

☿. Lighter or darker brownish yellow, gaster darker, eyes and teeth of mandibles black, shining, clothed with longer and shorter scattered yellowish white outstanding hairs, and short decumbent yellow hairs.

Head about as long as broad, sides evenly rounded, *posterior angles* round, *posterior border* finely and widely sinuate, whole head covered with very small, shallow, scattered punctures; *mandibles* curved, longitudinally striate and with a few small scattered punctures, armed with four sharp teeth, the apical one being considerably the longest; *clypeus* large, triangular, very shining and convex in centre, with a few faint longitudinal striae at sides; *frontal area* narrow, not distinctly defined, with very fine longitudinal striae; *frontal furrow* faint ending in a deeper broader furrow on vertex of head; *cheeks*,

base of *frontal carinae* and margins of *antennal foveae* covered with fine longitudinal striae; *antennae* 11-jointed, *club* 2-jointed, *scape* not extending beyond posterior border of head. *Thorax* convex and round anteriorly, narrowed abruptly to epinotum; *pronotum* with small raised tubercles anteriorly, smooth and shining at base; *mesonotum* about as long as broad, rounded at sides, not very convex, very smooth and shining, anterior margin pointed, which ends in a faint furrow extending into the pronotum and dividing the disc into two lobes; *epinotum* armed with two sharp, moderately long, curved spines, a little divergent and pointing slightly downwards; strong longitudinal striae extend along dorsal surface to base of spines; space between mesonotum and epinotum deep and broad, *declivity* abrupt, slightly longer than the dorsal surface, with faint transverse striae at sides. *Petiole* somewhat elongate, sinuate at apex then widened to beyond centre, where it is as broad as post-petiole, then narrowed to base, smooth and shining, slightly concave on dorsal surface anteriorly, with a transverse suture before base; *post-petiole* a little broader than long, slightly rugose and longitudinally striate, no longitudinal sillon present; *gaster* cordiform, microscopically punctured and with very small raised tubercles. *Long.* 5–5·5 mm.

Type in B.M. (N.H.). Described from six specimens taken by Miss L. E. Cheesman in Dutch New Guinea, Cyclops Mts., Sabron, 930 ft., June, 1936. Tube 195. The ants were nesting in the soil, and had constructed a carton shed over coccids on ferns. This is the largest species of *Orthocrema* in these regions.

Crematogaster (Orthocrema) major flavior n. subsp.

♀. Lighter or darker yellow; gaster brownish yellow, mostly smooth and shining. Closely related to the typical form but smaller and lighter in colour. The *scape* extends as far as the posterior border of head; the *frontal furrow* is shorter, fainter, and does not terminate in a deeper furrow. The *pronotum* is smooth and shining. The sculpture of the *gaster* is similar, but less pronounced. *Long.* 4·5 mm.

Type in B.M. (N.H.). Described from seven specimens taken by Miss L. E. Cheesman in Dutch New Guinea, Cyclops Mts., Sabron, 930 ft., June, 1936. Tube 194. Taken from a populous colony nesting in the soil.

var. **nigro-media** n. var.

♀. This variety agrees with the typical form in size, structure, sculpture, and hairiness, but the mesonotum, epinotum and spines, post-petiole, and femora and tibiae are brown to blackish brown; the gaster also is considerably darker.

Type in B.M. (N.H.). Described from six workers taken by Miss L. E. Cheesman in Dutch New Guinea, Cyclops Mts., Sabron, 1200 ft., June, 1936, in hut. Tube 200.

C. (*O.*) *major* and its forms belong to the *iritabilis* Smith group. Emery in the *Genera Insectorum* points out that Mann had recently erected a new subgenus *Rhachiocrema* for this group. This, however, is not the case. He created this new subgenus for the reception of one species of the group, *C. paradoxa* Emery, and a new species *C.* (*R.*) *wheeleri*, which he described as the type. Mann writes as follows (*Bull. Mus. Comp. Zool.*, **63** : 318, fig. 21, 1919) :

" *Crematogaster* subgenus *Rhachiocrema*, subgen. nov.

" In *Crematogaster paradoxa* Emery from New Guinea and the following new species the enormous development of the epinotal spines and the elongate pedunculate structure of the petiole and the elongate 12-jointed antennae with the 2-jointed funicular club are so different from other species in the genus that I separate them from *Crematogaster sens. strict.* as a new subgenus." The *iritabilis* group have a somewhat elongate petiole, but the epinotal spines are moderate, as are also the antennae. Furthermore the antennae are 11-jointed (*not* 12), as is also that of *paradoxa* ! Mann figures his *wheeleri* with 12-jointed antenna, but as far as I know it is the only *Crematogaster* in the world with 12-jointed antennae in the ♀ and ♀.

Paratrechina (Euprenolepis) manni n. sp.

♀. Head, thorax, pedicel, antennae and legs bright pale yellow, eyes and teeth of mandibles black, gaster deep violet black ; smooth and shining ; whole body except tarsi and funiculi set with scattered outstanding stiff black bristle-like hairs. Tarsi and funiculi clothed with very fine decumbent yellowish hairs.

Head a little longer than broad, slightly narrowed anteriorly ; posterior angles rounded, posterior border slightly sinuate ; *clypeus* large, transverse, convex, very slightly and widely sinuate at anterior border ; *mandibles* long, narrow, curved, *masticatory border* armed with six short, sharp teeth, that at the apex, near the centre and on base being the longest, the two between apical and central teeth being the smallest ; *antennae* long, *scape* extending beyond posterior border of head by about half its length, first joint of *funiculus* equal to 2nd and 3rd taken together, 2nd joint much the shortest, the rest elongate, last joint not equal to the two preceding taken together ; *eyes* moderate, round oval, not very convex, with moderately coarse facets, situated above sides of head and a little before middle ; *frontal area* transverse, not very clearly defined. *Thorax : pronotum* broader than long, convex, sides and anterior border rounded ; *mesonotum* round, convex margins sharply defined ; *metanotum* flat, in middle about a quarter the length of mesonotum, the *stigmata* slightly prominent ; *epinotum* round, convex gradually rounded to the somewhat flat *declivity*, which is about as long as the dorsal surface ; the epinotal *stigmata* are not as prominent as in *stigmaticus*

Mann ; *node of petiole* narrow, rounded above, inclined forward ; *gaster* short oval. *Long.* 2·5–2·8 mm.

Type in B.M. (N.H.) Described in honour of my friend Mr. W. M. Mann from three specimens taken by him at Malaita, Auki, Solomon Islands ; *ex* Coll. Arnold.

There were three specimens of this species, and a small ♀ of *Camponotus* (*Colobopsis*) *loa* Mann, all on the same pin and labelled "*Iridomyrmex myrmecodiae* Emery, var." Mann records that he took vars. of *myrmecodiae* in the Solomons with jet black gasters, and I have described the same from Japen Island, Dutch New Guinea, under the name of *nigriventris*. I personally think the close similarity of the three species is due to mimicry.

Emery in the *Genera Insectorum* lists *stigmaticus* Mann under *Patatrechina* subgenus *Nylanderia* ; but it undoubtedly belongs to the subgenus *Euprenolepis*, as does *steeli* Forel, which Emery queries as such.

P. (*E.*) *manni* is a more robust species than *stigmaticus* Mann, the thorax being more convex, and the pronotum shorter, and of course the colour is very different.

NOTES AND OBSERVATIONS.

Danaus plexippus in North Devon.—On November 4 Mr. W. R. C. Matthews, writing from Putsborough, Georgeham, N. Devon, informed me that at 9 a.m. that day, during a rainy gale, a boy had brought him a living specimen of a butterfly which he believed to be the Black-veined Brown. "It was found on trampled ground in a puddle of water sitting with closed wings, and had been seen a few moments previously sitting on a clump of grass. A continuous S.W. gale had been blowing for some time." It was in perfect condition. From the description sent me it seemed probable that the butterfly was *D. plexippus*, the Milkweed or Monarch butterfly, an opinion which was confirmed by Dr. F. R. Elliston Wright, F.R.E.S., of Braunton. As it was alive, I advised Mr. Matthews not to kill it. He succeeded in keeping it alive till November 24 when it died, having been quite lively till that date. It fed freely on flowers of bush *Veronica*. The insect is now in my possession. It is obviously a *plexippus* of the N. American race and is a female (lacking the black swelling on the second median nervure which distinguishes the male). It laid no eggs. Captain Dannreuther informs me that *plexippus* has not been seen in England since August 15, 1938, and that it has never previously been recorded here in November. It will be presented to the National Collection.—C. W. Bracken ; B.A., F.R.E.S. (Migration Recorder for the S. West).

Euphydryas aurinia and Strymon w-album in Wales (*Entom.*, **73** : 249, 253).—I found a small colony of *E. aurinia* about three miles

S.W. of Newtown, Montgomeryshire, on June 10, 1936. I failed to find it about the same date the following year, and have not been able to look for it since. I came across *S. w-album* in some numbers in one spot only on the Montgomeryshire-Shropshire border on August 6, 1937. They were enjoying ragwort blossom, and were not in cabinet condition—ragwort seems the favourite dish here, also in West Staffs; also, one insect only, on July 13, 1937, in mid-Montgomeryshire, in good condition.—(Rev.) E. S. Lewis; Forton Rectory, Newport, Salop.

Euvanessa polychloros in the London Area.—Mr. Dudley Palmer tells me that early last September he watched for some time a Large Tortoiseshell fluttering about a trolley bus standard near his house at Thames Ditton. It appeared to be looking for a place to hibernate. A few weeks earlier he saw another behaving in a similar fashion near Molesey. I think these observations of this species near London worthy of record owing to its apparent scarcity in recent years.—G. C. M. de Worms; Salisbury, November, 1940.

A Methuselah Nymphalis io.—In spite of the hard winter of 1939–40, hibernated *Nymphalis io* were very common last spring, and as in this area May was unusually warm, I had good opportunities for watching them in my garden. On a previous occasion I have drawn attention to the long life of the perfect *io*, and this year I watched the old age of one specimen which frequented a certain corner. Every few days it seemed to get more and more worn, until I saw it for the last time on June 1, just able to fly, but with half its wing area gone. Assuming that this particular insect emerged in July or August, 1939, on June 1 it had begun its tenth month at least of life as a perfect insect—not a bad record for our climate!—B. Tulloch (Brig.-Gen.); Hill Court, Abergavenny, June 16, 1940.

Kimminsia baltica Tjeder: A New British Record.—In view of the fact that Killington in the Ray Society Monograph on British Neuroptera lists only five authenticated British specimens of *K. baltica*, it may be of interest to record that on August 2, 1939, I took a specimen of this species at light on sandhills at Studland, Dorset. It is of the form having only three branches of the radial sector vein in the fore wing (Killington, *British Neuroptera*, 1937, **2**: 78).—H. L. G. Stroyan; Clare College, Cambridge.

A Further Note on Parascotia fuliginaria in Surrey.—In a note in the *Entomologist* for October, 1940, I recorded the capture of 7 male *P. fuliginaria* in a woodpile at West Byfleet. Subsequent assaults on the woodpile produced further examples, the final haul being 12 males in varying condition, one very fine large female at rest on a block of wood, and 2 pupae from which females, one crippled, emerged. Of these two, the second emerged on July 28, and as pupae from Sunningdale had emerged on June 28, the emergence would seem to cover a whole month. Incidentally, the first capture was made on July 6, not the 16th, as stated in the October

issue. The males are very skittish and hard to secure, but the only female I found would not fly even when touched. This sluggishness probably accounts for my failure to find any more.—H. L. G. Stroyan.

Bhutanitis mansfieldi Riley; not Unique.—While searching the residue of the late George Forrest's Yunnan material for further specimens worth mounting, I have found a second *Bhutanitis mansfieldi* (1939, *Entom.*, **72**: 207, 267), among some second-rate *B. thaidina*. It closely follows the type in the British Museum, but is in less brilliant condition, having obviously been longer on the wing.—M. J. Mansfield; 5, Chigwell Road, Bournemouth, November 19, 1940.

Neuroterus aprilinus Gir.—In the November issue Mr. Niblett refers to the suggested alternate generation of this species. I agree with him that *N. schlechtendali* Mayr can hardly fill the position, as the two galls are to be found within a few days of each other, so that there is no time for the development of the second generation. Last spring I collected galls of *aprilinus* and bred out the flies, some of which I placed in a glass jar and provided them with a twig of *Quercus robur* well furnished with catkin buds. One female fly at once proceeded to oviposit in a small bud at the base of a young leaf, one of the young buds that does not develop until next year. She did not examine the catkin buds. The operation took a long time, as if precision in placing the ovum in the right spot was not easy to achieve. After a short rest she ran up the twig, and without any preliminary examination drove her ovipositor into a second young bud. She took ninety minutes over placing this ovum. Thus, unless the fly had made two mistakes, it seems as if there were no alternate generation, but the ova remain quiescent until next year—a period of some eleven months before development is apparent. Adler has shown us that a species of fly may remain dormant for some months as in the case of *Audricus albopunctatus* Schltdl., etc., and then emerge to produce its own species, but I am not aware that an egg has been known to remain for ten or eleven months before hatching. If ova can remain dormant for months, then some of the species that were being looked for to complete the blanks in the table of alternate generation may not exist. Other species besides *aprilinus* may have long periods in the egg stage.

As more flies emerged from the galls I sleeved some on an oak in my garden, and so far nothing has developed, so the only thing is to wait for results in the spring, hoping that I shall see galls of *N. aprilinus* appearing on the tree. Other experimental work this last summer was disappointing, so possibly this attempt to solve the alternate generation puzzle of *aprilinus* may also lead to no result.

It is not satisfactory to leave the matter in this position, but I am offering these facts in case any other workers are inclined to try the same experiment.—H. J. Burkill; 3, Newman's Court, Cornhill, E.C. 3, November 20, 1940.

FOOD-PLANT OF CALLIMORPHA JACOBAEAE L.—With reference to notes on the food-plant of the above-named species by Robert B. Benson and Mr. C. J. Paton (*Entom.*, **73** : 236, 259), some years ago there was a large area of allotments (since built over) at Kensal Rise, London, and I regularly found larvae of *C. jacobaeae* on *Tussilago farfara* there. Though ragwort was abundant it was seldom that one ever saw larvae on that plant.—ERIC W. CLASSEY ; 141, Portnall Road, Maida Hill, W. 9.

ORTHOPTERA OF GLAMORGAN.—During the third week of September, this year, we noted the occurrence of two species of Orthoptera apparently hitherto unrecorded from this county, or indeed from any other county of Wales. *Gomphocerus rufus* was plentiful on a steep dampish hillside facing east, but appeared to be of very limited distribution. *Platycleis grisea* was discovered to be reasonably abundant amongst sparse vegetation on a dry southern cliff-face, as near as 15 yards from high-water mark. Specimens taken appeared to be slightly brachypterous when compared with measurements given by Malcolm Burr.—P. S. BROWN, LESLIE L. R. WHITE ; 89, Porth-y-Castell, Barry, Glam., September 25, 1940.

EPIMICTA MARGINALIS HAL. IN DUMFRIESSHIRE, ETC.—I have taken three specimens of this Braconid which Morley (*Entom.*, 1924, p. 194) says is extremely rare, and hitherto only known from Southern England, while Marshall states it has not been noticed from any other country. Two were found in a clearing in a wood at Quentin's Hill near Gretna. They were beaten from either sallow or birch, the dates being 27.vii.34 and 13.vii.38, the weather on both occasions being dull and inclined to rain. A third specimen was swept at Easton, near Longtown, in Cumberland, so long ago as 25.vi.29. It is a comparatively large and robust insect, resembling the species of the commoner genus *Oenone*, but quite distinct in the absence of the post-scutellar spine and colour of the abdomen. One of my specimens has been kindly verified by Mr. A. W. Stelfox.—JAS. MURRAY; 6, Burnside Road, Gretna, Dumfriesshire.

ENTOMOLOGY UNDER DIFFICULTIES.—I remember my old headmaster (George Podmore, Grange-over-Sands), himself a keen entomologist, telling us he had received letters from Old Boys in Flanders mentioning the insects they had seen from the trenches, and saying how glad he was that it had helped to take their minds off the guns. Now, in 1940, another generation is experiencing the same thing and regretting that exigencies of army equipment prevent one from having reference books at hand. I expect others will have noted how sensitive insects, particularly the Lepidoptera, are to gun-fire. During July and early August, when we were having regular immigrations of *Pieris brassicae* from France, it was very noticeable how they would rise and " dither " as if thoroughly alarmed. Among the Coleoptera, glow-worms abound as well as *Carabus violaceus*, but they appear to be insensitive to gun-fire. When we were being dive-bombed and had taken cover on one occasion I noted a ladybird,

Coccinella septem-punctata, usually enjoying a lazy existence round our sandbags, violently agitated. It is not easy to observe the effects of severe earth concussions on beetles. Among the Orthoptera, the ubiquitous grasshopper, *Chorthippus bicolor*, is greatly in evidence, and I saw what had been a fine green *Locusta viridissima* run over by an Army lorry. The crickets keep one company on sentry-go and their chirping helps to pass the night hours. Now, as it seems that our armies will have to traverse both Europe and Africa sooner or later to straighten out the present mess, more and more entomologists will get a chance to collect and observe abroad. Army discipline and the need for caution in mentioning one's whereabouts may prevent most of the results becoming immediately available, but it is to be hoped that all data will be carefully preserved for use after the war. Might I be allowed to use your columns for a final personal note? So many correspondents have written and their letters have been sent on to me that I cannot reply to them all. I hope soon to have a less vague address than "somewhere in the south-east," and more facilities for writing.—J. MANWARING BAINES, B.Sc.; Royal Artillery.

RECENT LITERATURE.

Insects Pests in Stored Products. By H. HAYHURST. London: Chapman & Hall, 1940. Pp. xii + 84; 48 plates from photographs by H. BRITTEN. 15*s*.

This book claims to give a "comprehensive description of all the insects causing difficulties with stored products." Unfortunately the claims are more comprehensive than the descriptions. For example, on p. 20 the five species of *Cryptophagus* are all described as "brown in colour, about 2½ mm. long," and it is more than doubtful whether the illustrations of these five species would enable anyone to get any further in an attempt to name them. Admittedly the specific name may not be of any importance to those for whom the book is intended, but this type of "description" is characteristic of the whole volume; it is only saved from being ridiculous time and again by the excellence of the relevant photograph. But not even the photographs can help when the species are misidentified, e.g. fig. 7 is not *Ptinus subpilosus* but obviously another *P. fur*; *C. fowleri* and *C. pallidus* (Plate 14) are synonymous, but the photos appear to show different species. Again, if the editor was not capable of doing it, the author at least might have avoided standing so many larvae on their heads (which doesn't help comparison), or such ludicrous pictures as those of the cockroaches doing the side-stroke (Plate 44). The figures of Lepidoptera are excellent, except for *Tinea flavescentella* and *Tineola biselliella*; these are both admittedly rather difficult subjects, but the picture of the latter might be anything. Following the "descriptions," undigested lists of products from which the different species have been recorded are given. In the case of *Ptinus tectus* this list occupies a full page; much use-

less repetition could have been avoided and much space saved by an analytical treatment of these haphazard lists, the substance of which is repeated all over again in the last 24 pages of the book, where the insects are grouped under the products of which they are alleged to be pests. From this list one can ascertain such illuminating facts as that *Niptus hololeucus* is a pest of cement, that *Ephestia elutella* is the only pest of " drugs " ; that *Scenopinus* is a pest of the " substance or place " known as Lepidoptera, and so on. It is perhaps not surprising that such a book should need to be introduced to an eager public by both a foreword and a preface. The latter illustrates well how peculiarly ignorant the general public is of the facilities available in this country for the identification of pests; its author could discover " no source of help." Yet there are both Government and provincial institutes able and willing to give free and reliable help such as is not to be obtained from this volume.

Zoology of Oxfordshire. Edited by Dr. B. M. HOBBY. Reprinted from *Victoria County History of Oxfordshire*, 1 : 57–222, 1939.

Of this considerable volume, 118 pages are devoted to the Insecta, a large share, but even at that some Orders have been omitted ; or is it correct to assume that Oxfordshire knows no lice ? Happy county ! Totting up the species whilst standing-by during air-raids has whiled away quite a little time, and the statistically-minded may like to have the totals. It must be understood, however, that the figures are not guaranteed. They are Apterygota 19 ; Orthoptera 19 ; Dermaptera 3 ; Plecoptera 5 ; Psocoptera 27 ; Ephemeroptera 17 ; Odonata 19 ; Hemiptera 407 ; Megaloptera 5 ; Neuroptera 27 ; Mecoptera 3 ; Trichoptera 57 ; Lepidoptera 1300 ; Coleoptera 1988 ; Strepsiptera 9 ; Hymenoptera 740 ; Diptera 1961 ; Siphonaptera 31 ; making a grand total of 6637 species. Oxford has been fortunate in the enthusiasm and keenness of its resident naturalists, such as F. W. Hope, J. O. Westwood, and more recently Cmdr. Walker, A. H. Hamm, J. Collins and E. G. R. Waters. The immediate vicinity of the City has probably been as well worked as any area of similar size in the Kingdom, but it is still true that large areas of the county are hardly touched, and would undoubtedly yield many additional species. Dr. Hobby has been fortunate in his collaborators, and thoroughly deserves congratulations on his results, for this is certainly one of the best volumes so far produced in the series. It has clearly been most carefully compiled and edited.

The London Naturalist for the Year 1939.—This is a much slimmer volume than usual, but contains a certain amount of entomological matter. In connection with the survey of Limpsfield Common, brief lists of Lepidoptera and Hymenoptera are given—both, as stated by their authors, rather fragmentary, but at any rate a start. The most interesting record is probably that of the Pompilid *Priocnemis clementi* Haupt, not hitherto recognized as British. Of wider scope are a list of the Asilidae of Surrey, by Parmenter and Oldroyd, and H. J. Burkill's Plant Gall Records for 1939.

South London Entomological and Natural History Society, Proceedings for 1939-40.

This volume, with six excellent plates, 104 pages of letterpress and a number of valuable contributions, is well up to standard. Two papers by Dr. Cockayne, one on *Ortholitha umbrifera* and *O. scotica* and the other on Hybrids, one by C. N. Hawkins on two broods of the hybrid *Lycia hirtaria* ♂ × *Poecilopsis lapponaria* ♀, notes on breeding and setting Microlepidoptera by L. T. Ford, and an account of the parasites of gall-causing insects by M. Niblett make up the bulk of the transactions. A pleasing feature of the activities of the Society is the renewed success of the field meetings which, some years ago, seemed to show signs of coming to an end from lack of support.

N. D. R.

SOCIETIES.

The South London Entomological and Natural History Society.—*August* 22, 1940.—Dr. E. A. Cockayne, A.M., F.R.C.P., F.R.E.S., President, in the Chair.—Mr. J. Deal exhibited bred examples of *Actias selene*, the Moon Moth; Dr. G. V. Bull, various parasites of lepidopterous larvae bred during the season; Mr. T. R. Eagles, young larvae of *Clostera curtula* from Bookham, Diptera from the same locality, and parasites of the egg of *Smerinthus populi*; Mr. C. N. Hawkins, examples of three broods of *Malacosoma neustria* from different localities, which seen side by side looked quite different; Mr. F. D. Coote, on behalf of Mr. Hy. J. Turner, the very remarkable and local Saturniid, *Graëllsia isabellae* Graëlls., ♂ and ♀, from Spain, and on his own behalf ova and larvae of *Acasis* (*Lobophora*) *viretata* and *Lycaenopsis argiolus*. Mr. S. Wakely read a paper on his recent breeding and captures of Micro-lepidoptera, and exhibited the various species mentioned.

October 26, 1940.—Mr. F. Stanley-Smith in the Chair.—New members: Mr. Denzil Fennell and Mr. E. Pelham Clinton, of Martyr Worthy Place, Winchester, Hants.—Mr. E. E. Syms exhibited the Hempiteron *Ploiaria culiciformis* De Geer and the Neuropteron *Chrysopa carnea* and read notes on their life-histories; Mr. S. Wakely, bred series of *Gnophos obfuscaria* Hb., *Crambus falsellus* Schiff., *Gracillaria phasianipennella* Hb. A letter was read from Mr. H. E. Barren, a member of over fifty years' standing. It was agreed, in view of the existing circumstances, that the future meetings of the Society be held on Saturday afternoon.

November 9, 1940.—Mr. F. Stanley-Smith in the Chair.—Miss B. M. Pearson, 20, Merridale Lane, Wolverhampton, was admitted a member.—Mr. S. Wakely exhibited a series of *Trichopteryx polycommata* from Surrey; Mr. E. E. Syms, cocoons of the Neuropteron *Conwentzia psociformis*; Mr. Eagles, *Zanclognatha tarsipennalis* and *Pyralis glaucinalis* from Enfield, and a living *Polia ornithopus*. Lantern-slides were shown by Messrs. W. J. Finnigan and E. E. Syms. —Hy. J. Turner (*Hon. Editor of Proceedings*).

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LYSANDRA CORIDON PODA VAR. *SYNGRAPHA* KEFF.

BY S. G. CASTLE RUSSELL.

IN the April number of the *Entomologist*, 1936, **69**, I gave an account of an attempt to answer the following questions:

1. Are fertile ova deposited by var. *syngrapha?*
2. If so, are the resultant imagines *syngrapha*, type or both?

The result of my experiment was the emergence of one imago only, a male of typical appearance which indicated that No. 1 point was proved. I had only some 20 larvae that survived hibernation and these produced four pupae.

In 1939, being again within reach of the food-plant (*Hippocrepis comosa*), I determined to make another attempt, and in April, 1940, found about 20 larvae which had survived hibernation. These eventually decreased in numbers until finally 10 well-grown larvae, apparently healthy, were feeding up. By the end of July all had disappeared, presumably for pupation. On August 3 a typical female emerged, but was not followed by others. On examining the growing plant I found half a dozen full-fed dead larvae buried from 1 to 3 in. in the soil, and two dead pupae. The result of this second attempt was therefore practically similar to that of the first one, with the difference that a female instead of a male emerged; although confirming the fertility of the ova, it did not answer the second question.

In 1937 I sent two females to Mr. J. Shepherd, of Herne Bay, who is a patient and successful breeder. He informed me that he had obtained a large number of ova, but like myself failed to get any considerable number of imagines, although his efforts were more successful than mine, as he obtained seven emergences, all males.

The combined poor results suggests hereditary weakness. I have no experience of breeding from ova laid by typical parents, but I have found no difficulty in breeding imagines from wild collected larvae. The fact that the species is so abundant on the wing suggests that there is not much loss in the hibernating stage, but I have found that in the case of another insect equally abundant in the imaginal state, viz. *Argynnis selene*, my attempts to rear from the egg have been quite futile.

I hope to make another effort this season as it is very desirable

to secure a pairing between imagines obtained from a *syngrapha* parent, as this would give useful information. Unfortunately the prospect of netting an example of the variety is not now good, as the Air Ministry have taken over a down where there was always a good chance of obtaining a specimen. The result of this, I fear, will be as in the last war. After evacuation the ground will be covered with concrete bases from which buildings have been removed and the lost fauna and flora will be replaced by rank weeds.

Cotswold,
Forest Gardens,
Lyndhurst, Hants.

EARLY APPEARANCE OF MACULINEA ARION.—Referring to the notes on early dates appearing in the January *Entomologist* (**74** : 18), it may be of interest to record the capture of *arion* on May 31, 1940. Whilst collecting with Mr. L. B. Clarke in a remote and private locality on the Cotswolds we were delighted to see a fresh specimen on the wing. So far as I know it has never been recorded in May before. The previous January was very cold here, with severe frosts, culminating on the 21st in 36 degrees, or 4 degrees below zero, and it is difficult to understand why a hard winter should be followed by this early emergence.—C. GRANVILLE CLUTTERBUCK; 23, Heathville Road, Gloucester, January 21, 1941.

CALLIMORPHA JACOBAEAE ON TUSSILAGO FARFARA.—I have been most interested in the observations of Messrs. Benson and Paton in the October and November numbers of the *Entomologist* on the food-plants of *Callimorpha jacobaeae*. I was surprised to find that it is apparently so unusual for the larva to eat *Tussilago farfara*, since in my last few summer holidays in Cornwall I have found this to occur quite regularly. I first found Cinnabar larvae on coltsfoot in August, 1938, on a piece of waste ground in Bude, where ragwort, groundsel and coltsfoot grew in abundance. I could not find any larvae on ragwort, to my great astonishment; but hundreds were feeding on the groundsel plants, and there must have been several dozen feeding on coltsfoot with great gusto.

In August, 1939, I came across a spot near Perranporth where ragwort and coltsfoot were flourishing, and here again, though the majority of Cinnabar larvae (of which I could have collected 500 with ease) were eating ragwort, a minority showed a natural preference for coltsfoot. In August of 1940 I found the same thing near St. Ives; with an abundance of ragwort available, on which most of the Cinnabar larvae were feeding, a number still chose coltsfoot instead. In each case I actually witnessed the larvae eating the coltsfoot, and I conclude that in North Cornwall, at any rate, this is quite a normal occurrence.—K. P. WHITEHORN; 205, Hither Green Lane, S.E. 13.

A FEW COMMENTS ON SOME INCONSISTENT CRITICISM.

By B. C. S. Warren.

In the February number of this magazine Mr. Wheeler makes yet another attack on the International Zoological Code, and my work and methods. I do not intend following him into arguments on nomenclature further than is necessary to correct some of his statements which misrepresent my work and de Prunner's; his contentions have all been answered before.

Mr. Wheeler's recent attempt to abolish de Prunner's names (*Ent. Record*, **52** : 59) having failed, he now condemns de Prunner's work in general. In so doing he misquotes me as having said de Prunner's descriptions under "any ordinary rules of translation" were "nonsense." What I said was that if one turned them the wrong way round, as Mr. Wheeler had done, it made rubbish of them. It is surprising, however, to say the least of it, to find Mr. Wheeler condemning de Prunner's work because the latter failed to observe "ordinary rules," and for this reason claiming that it should be abolished, and his names disregarded. Yet was not de Prunner doing just what Mr. Wheeler and those who think like him so frequently do, following his own rules? And in fairness to de Prunner one must say that if he chose to refer to what we call the "upperside" of a butterfly as the "outside," and the "underside" as the "inside," at a time when every writer used what terms he liked, he was quite at liberty to do so. It may be very simple to make game of these expressions now, but what rules lay it down that "outside" if applied to a butterfly must denote the "underside"? It was at least as likely to mean the "upperside," so if Mr. Wheeler did not know which, the obvious course would surely have been to have selected that surface which made sense of the description, instead of that which made nonsense; and the same applies to de Prunner's terms for the wings.

However, de Prunner's names remain valid, and Mr. Wheeler turns with renewed vigour against the Code, citing my book as a perfect proof of instability resulting from the use of the Code, pointing out that eight "accepted" names in the genus *Erebia* had had to be changed. How, he asks, in the face of this, can I state that the use of the Code brings stability? There could certainly be no better example. In the few years since my book came out, four men would have introduced changes in the names I used—if they could. Mr. Wheeler, Frhr. v. d. Goltz and two men in Italy. Though they all objected to my nomenclature, their views did not agree, and each would have adopted a different set of names. We know what Mr. Wheeler would change; Goltz would change more;

both men in Italy would have adopted some of the names I did, and each made other changes I did not. Their efforts, however, will trouble nobody; unless I made mistakes in the application of the rules, the names I used cannot be changed again, unless the Code is changed, which possibility is, happily, remote. Such is the reason why I maintain the use of the Code leads to stability, and it seems fairly simple to understand. In his book on Swiss butterflies Mr. Wheeler changed the names of three species of *Erebia* from those used by Kirby; and of these changes, one was to *transfer* the familiar name *manto* from one species to another. The changes I made (and there were no "transfers") were "unintelligible"; the changes Mr. Wheeler made were, presumably, "intelligible." Possibly if one could have asked Kirby, he might not have found them so. I can add that the "transfer" of *alecto* Hb. from one species to another was prevented by the Code. Further, Mr. Wheeler was indignant at my substitution of *pluto* de Prn. for the "generally accepted" *glacialis* Esp., though he in his changes had replaced the latter with *alecto* Hb. From this we see that the "general acceptance" of a name depends in part on the name that replaces it.

Commenting on my reference to the work which has been done under the Code rules, Mr. Wheeler remarks that this could have been done and been "generally intelligible" if the "generally accepted" names had been used as the specific names from which to start. Could it? That would depend on what was understood by the elastic terms "generally intelligible" and "generally accepted," and judging from the example I have just given of the latter there seems little probability of "general" agreement on these vital points, without rules; consistent scientific method would therefore have been impossible. Mr. Wheeler goes on to object that there "is nothing scientific about a specific name as such," and that it is difficult to understand how any argument could be based upon "any scientific value attaching to them." It certainly is difficult, as it is also to see any point in this remark, unless it be an insinuation that I used such an argument. The scientific value attaching to a name depends on its origin, method of selection, and the degree of accuracy with which the method has been applied. A name established by accurate scientific method has a scientific value that a name chosen with complete disregard for fact, or consideration for the meaning its author attached to it, can never have.

This covers all Mr. Wheeler's remarks relating to my work, but I may add a short story of a name, that illustrates better than any argument the methods of some who repudiate the law of priority in particular, and the Code in general.

The ssp. *mackeri* Fuchs, of *E. epiphron* is remarkable for its distribution, extending from the Vosges (whence the types came)

through the mountains of central France to the Eastern Pyrenees. It happens that Goltz, who never tires of attacking the Code and especially priority, had also given this race a name, i.e. *vogesiaca* Goltz. His name fell as a homonym. Readers may then be surprised to hear that Goltz, very indignant at my treatment of his name, claimed that it had fourteen days' priority over *mackeri*! (*Dt. ent. Z. Iris*, 1939, I write from memory, so cannot be certain of the date). To prove my ignorance complete he further asserted that the race of the eastern Pyrenees had no connection whatever with that of the Vosges; they were absolutely distinct. The inconsistency of his attitude seems to have occurred to him, however, and later, in order not to sink the name *mackeri*, he concludes it would be best to apply *mackeri* to the race of the eastern Pyrenees which was without a name. His own *vogesiaca* would then stand for the race of the Vosges! The fact that in the same article he had denied that the race of the eastern Pyrenees had any connection with that of the Vosges (the locality of the *mackeri* types) he calmly ignores. No doubt Goltz maintains his actions to be "intelligible," and the name *vogesiaca* "generally accepted." But if readers are tempted to smile, do not let them suppose his actions can be set aside as those of a crank. In transferring *mackeri* to a race he claimed (even if incorrectly) had no connection with the race to which Fuchs had given the name, Goltz was only putting into practice what Mr. Wheeler advocates when he repudiates Verity's use of the name *parthenie*, etc., etc.; and if Mr. Wheeler claims that he is justified in following his own rules, why should not Goltz, or anyone else, do the same?

After this demonstration of the value of the Code it is only necessary to add that such irresponsible actions are but the natural sequel to the equally irresponsible criticisms that sometimes are levelled against scientific method.

Sidney Webb Collection Labels.—Recently a considerable number of insects have passed through my hands labelled, "Dover, 1899, S. Webb." Now whatever the label may mean it certainly does not mean that the insect was taken at Dover in 1899 by Sidney Webb. The label appears on insects which have not been and never will probably be taken in Kent, and moreover I should doubt if any collector, however industrious, can have amassed the number of insects in one year which bear this label. Any collector, therefore, who finds in his collection insects so labelled should understand that the label probably means no more than that they were acquired in the year 1899 and were from the collection of Sidney Webb. It certainly does not mean that Dover is the correct locality of the insect.—W. Parkinson Curtis; 17, Christchurch Road, Bournemouth.

MIGRATION RECORDS, 1940.

By Capt. T. Dannreuther, R.N.

1940, like 1937 and 1939, may be regarded as another " Cabbage White Year," for no other migrant species has been reported in large scale movement. Lack of continental reports makes the country of origin of the flocks observed in movement a matter of speculation. Even the direction of flights observed at the Shipwash Light Vessel, off the Essex coast, was noted as to the eastward on three dates with one between (July 21) in the opposite direction and against the wind, whereas at the same period at the North Foreland there was a steady stream flying N.W. in westerly winds.

I. *Migratory Movements of* Pieris brassicae.

The first flight of *P. brassicae* was reported coming from Wales and passing Hilbre Island in thousands on May 21 (see *Entom.*, **73** : 210). On May 26 a similar flight to the S.W. was seen on an 8-mile front between Catcleugh and Carter's Bar in the Cheviot Hills. (R. Craigs.) On June 5 hundreds appeared at Ruaig and Caolas in the isle of Tiree (Inner Hebrides). (Prof. J. W. Heslop Harrison.)

On July 14 extensive movements began, but appeared as confusing as the migrations of our starlings. At Brighton and at Wheatfen Broad, in Norfolk, thousands were flying north ; but through Cambridge and Harpenden (Herts) they were flying south. From this date to the first week of September there appear to have been two concurrent and extensive flights, one of which took a southerly direction and was traced from Yorkshire across the Midlands, including East Anglia, to South Wales and Bristol, perhaps extending to the south coast and Co. Cork, where larvae destroyed cabbages later. The other movement appeared to come from the south and was recorded at many places all along the south coast of England, spreading inland and generally flying leisurely with the wind, sometimes with a percentage of *Pieris rapae* in company.

Flocks were not actually seen coming in from sea before July 17 at Hastings, when the direction of flight was E.N.E. with the wind, force 4, at the rate of 120 per minute (3892 counted—T. D.) ; but before this, from May 18 onwards, abnormal numbers of *Pieris brassicae* had been noted at Totnes and Folkestone, and in June considerable damage to fields of kale and turnips was reported in East Sussex and in the Dover area.

Thousands were reported at Brighton on July 14 flying N.E.

and next day appeared as a "snowstorm" at Portslade. From the 17th to 19th large flocks were seen flying N.E. at Eastbourne, Bexhill, Fairlight and Crowhurst. On July 25 thousands more came in at Brighton and Eastbourne, and next day were passing Hastings at 1000 per hour and continued so in sunny intervals to the 28th, when many hundreds appeared in clover fields near Sandhurst (Kent). On July 29, and again on August 4, some thousands came in from the sea over Canford Cliffs at Bournemouth, and up to August 11 swarms were noted at Torquay and Devonport.

Subsequent damage by larvae to market gardens was reported from many coastal areas, but not on quite the same scale as in 1939. In the north the damage was little above average, and at Glengarriff (Co. Cork) "the resultant larvae were mostly eaten by Chaffinches." (J. E. Flynn.) In South Uist (Outer Hebrides) "larvae were seen in big numbers, August 25" (Prof. J. W. Heslop Harrison), and at Helmsdale (Sutherlandshire) "there was a heavy concentration in cornfields" (C. P. Sampson). At North Wootton, in The Wash, early in August there were "numbers so vast that when disturbed it was impossible to see across the fields." (N. Tracy.)

II. *Records of Insects at Sea*, 1940.

From the Haisboro' Light Vessel, 8 miles N.E. of Mundesley, a damaged moth, ? *Procus strigilis* was taken on April 15. (S. G. Sharman.)

From the Shipwash Light Vessel, 5 miles S.E. of Orfordness and 12 miles east of Harwich; specimens identified by Miss M. E. Miller of Chelmsford:—

May 24: *Orthosia gothica* and a Clothes moth flying north at 6.30 a.m. Wind E., force 3. Temperature 50° F.

May 28: With a light N.E. wind at 2 p.m., insects seen flying west included a Honey Bee and a Lacewing.

May 30: Two *Phlogophora meticulosa* flying west at 6.30 p.m. Calm.

June 9: Two moths, *Depressaria* spp. and dozens of flies flying north with a light S.S.W. wind by day.

June 25: Two *Leucoma salicis* and several *Tortrix viridana* flying east at 5.15 a.m. Wind W.N.W., 2.

June 29: At 4.30 p.m. a male dragonfly, *Libellula quadrimaculata*, captured flying west. Wind S.E., 3. Temperature 64° F.

July 15: Two *Triphosa dubitata* L. taken at 6.30 a.m. when flying to the eastward in misty weather. Wind south, 2. Temperature 59° F.

July 16: Dozens of *Pieris brassicae* with some *Aglais urticae*, of

which some settled on board, were flying to the eastward at 5.30 p.m. Wind N.W., 2. Temperature 62° F.

July 21 : Dozens of *P. brassicae* were flying round the ship and to the westward at 6 p.m., in cloudy weather with thunderstorms. Wind W.S.W., 3.

July 22 : Dozens of *P. brassicae* with some *Maniola jurtina* and dozens of Lacewings were flying east from 10 a.m. to 3 p.m. Wind W.S.W., 3. Temperature 68° F.

July 29 : Dozens of *P. brassicae* were flying round the ship all day to 8 p.m. in cloudy and thundery weather. Wind N.W., 3. Temperature 68° F.

August 20 : *Phlogophora meticulosa* taken at 6 a.m. Wind west, 3.

August 31 : Several *Amathes c-nigrum* seen at 5 a.m. ; three captured. Wind N.W., 3. Temperature 59° F.

September 6 : Two *Hadena trifolii* Rott. (identified by H. M. Edelsten) with hundreds of flies, *Dilophus febrilis* L., taken at 6 p.m., in misty weather. Wind N.W., 3. Temperature 60° F.

September 8 : Dozens of *Aglais urticae*, arriving from the N.W., were seen flying to the eastward at 4 p.m. in calm fine weather. Temperature 62° F. (C. L. R. Turnor, lamplighter.)

These are the first records at sea received for *Triphosa dubitata* and *Hadena trifolii*. Observer was absent from September 9 to October 4 and later recorded the following :—

October 12 : Two *Nomophila noctuella* flying east at 4 p.m., B.S.T., in calm misty weather. Temperature 64° F.

October 20 : Two Norfolk dragonflies, *Aeshna isosceles* Müller, with a Gem moth, *Cidaria obstipata* Esp., flying eastwards at 8 a.m. in misty weather. Wind east, 2. Temperature 58° F. The dragonfly was a male in good condition, and is now at Rothamsted Experimental Station.

October 22 : Several *Himera pennaria* L., of which a male was captured at 1 p.m. in misty weather with a S.S.E. wind, force 3. Temperature 60° F.

November 3 : Two *Erannis aurantiaria* Esp. captured at 8 a.m., B.S.T., when flying to the S.E. in mist after heavy rain. Wind N.W., 3. Temperature 54° F. (C. L. R. Turnor.)

Himera pennaria and *Aeshna isosceles* are the first records at sea and the latter at a very late date in the season.

III. *Continental Records*, 1940.

Some early records were received from the Bayonne district of the Basses Pyrénées (before Guy T. Adkin and Mrs. Muspratt returned to England), of which the following show the first appearances : *Leucania unipuncta*, fresh on February 21 ; *Vanessa atalanta*

on March 13 ; *Colias croceus* on March 14 ; *Macroglossum stellatarum* on March 19 ; *Vanessa cardui* on March 21 ; *Nomophila noctuella* on April 1 ; *Celerio lineata livornica* on April 16 and 22. A few *Plusia gamma* appeared on April 16, when *N. noctuella* was still scarce on the dunes, but *V. atalanta* fairly common. *M. stellatarum* was also seen near Aubigny (Pas de Calais) on March 31. (J. N. Eliot.)

IV. *General Summary of Immigrant Insect Records*, 1940.

The following notes on species present in the British Isles during the 1940 season are deduced from 700 record cards and two dozen completed schedules of observations. In the south of England, the high percentage of cards recording single insects bears out the general impression of a poor season for Lepidoptera: not merely lack of observation. From the Midlands and North only scanty records are in hand, which makes estimates of the range rather speculative. It is hoped that the keeping of schedules of daily observations will be more general next season.

Vanessa cardui : Only 750 recorded as compared with 4500 in 1939. No less than 52 were recorded during the exceptionally severe winter months. In addition to the Irish records given in *Entomologist*, **73** : 110, the species was first recorded at Ilfracombe on February 24, Ashburton March 4, Aberdovey March 7, Ross-on-Wye March 10, Crowhurst (Sussex) March 19, Ventnor, Lymington, Eastbourne, Hailsham, Maidstone, March 20 ; and in ten other localities before the end of March. It was first seen coming in from sea over the Purbeck Hills (Dorset) on May 1. One reached Carter's Bar in the Cheviots on May 26, Ardrie in Lanarkshire on June 2, and Unst in Shetland Is. on June 4. About 20 were seen in the isle of Tiree (Inner Hebrides) on June 5. In the autumn the species was scarce everywhere, but at Dungannon (Co. Tyrone) it was common and a dozen appeared together in the Isle of Man in August. It was last seen at Potterne (Wilts) on October 22. No large immigration or return flight was reported.

Vanessa atalanta : As in 1939, over a thousand were recorded in England. In addition, on June 5 they were seen in hundreds on a restricted front in the isle of Tiree and this shows the westerly range, as few were found on Gunna, also in the Inner Hebrides, next day, or in the Outer Hebrides later. (Prof. J. W. Heslop Harrison.) It was recorded at Unst (Shetland Is.) on June 7. (Mrs. Sutherland.) In addition to the winter records, suggesting hibernation, given in *Entomologist*, **73** : 88 and 131, single specimens were active at Totnes on February 8, Lewes March 3, Ashburton March 4 ; at Hastings, Billingshurst (Sussex) and Porlock (Som.) March 11 ; Brighton and Eastbourne about March 16 ; Torquay and

Timoleague (Co. Cork) March 21—making sixteen winter records in all compared with three in 1939. At Brighton on April 11 one was first seen flying north; the next reported was seen coming in from sea over Purbeck Hills on May 1st; but no migrating flocks were seen later nor any return flight noted and the species was generally scarce, though in dozens near Tavistock and Cardiff on September 21 and common in Dublin on October 11. It was last seen in the Isle of Man on October 28, at Poole (Dorset) on the 29th, and at Timoleague on November 15. At no date do the schedule observations record as many as a dozen together elsewhere.

Colias croceus: Over 300 reported, as compared with 100 in 1939 and 3300 in 1938. It was first seen at Ashburton on April 24 (A. Adams), and next seen coming in from the sea at Torquay on May 1 (Miss Thorn). It did not appear in eastern counties until July 28 at Eastbourne, by which date it had reached the Isle of Man, the farthest north recorded. A single specimen only was seen in Eire at Timoleague on September 26 and only one in Norfolk, at Lakenham on September 3. It was commoner in the west—September 11, 23 fresh specimens were taken at Plymouth. (F. W. Jeffrey.) Except for single specimens in Caernarvonshire and Worcester it was unrecorded in the Midlands, and was last seen at Poole on October 22.

Colias hyale: After apparent absence in 1939, a male was seen at Eastbourne and one taken in Polegate woods on July 29. (E. C. Arnold.) Three others were captured at Landulph, near Plymouth. (Rev. J. H. Adams.)

Acherontia atropos: As in 1939, ten wild moths were taken—at Achy (Co. Kildare) May 11, Wilmslow (Ches.) May 14, Bramhall (Ches.) June 3, Pevensey June 15, Southwick (Sussex) June 24, Inverness—found dead in a beehive, Bournemouth, Gretna (Dumfriesshire) September 6, Hitchin (Herts) September 30, North Uist (Outer Hebrides), and one female, exhibited alive to Oxford N.H. Society, emerged November 19. Larvae were also taken at Selsey, Reading, Norwich, Wendling and Bangor (Wales) (see *Entom.*, **73**: 253, 258 and 279).

Herse convolvuli: Fourteen were seen in 1939, but only one recorded in 1940. It was taken by W. Eltringham at the end of September near Ryton (Durham) and identified at King's College, Newcastle. (Prof. J. W. Heslop Harrison.)

Macroglossum stellatarum: Seventeen were recorded on cards and about twice that number occur in the schedules, which is about the same as in 1939. It first appeared at Eastbourne on May 9 and was last seen at Plymouth on October 1. It was recorded occasionally in most southern counties from Essex to Gloucestershire, but nowhere else except for two at Timoleague (Co. Cork)

September 2 and 5. The range cannot be given for lack of records from the Midlands.

Plusia gamma : No mass migration or return flight was witnessed. A rough estimate of 3500 recorded by fewer observers and without lights shows less than an average year, as half of these were noted on 132 dates in the complete schedule kept at Stroud (T. B. Fletcher) with a maximum of 150 on June 30. Similarly it was recorded in hundreds on a single date (June 5) at Timoleague and on July 14 at Crowlink on the Eastbourne Downs, with few elsewhere in surrounding districts to indicate the settling of migrant flocks. In some schedules the species is almost absent. It was first seen at Aberystwyth on February 22 (Dr. J. H. Salter), and in Co. Cork on February 24, and a dozen specimens were reported there before it turned up at Marlborough on March 22. It was seen at Unst in the Shetland Is. on June 28 (Mrs. M. C. Sutherland) and the westerly range is indicated by a couple of dozen recorded in the isle of Coll (Inner Hebrides) on May 27 (Prof. J. W. Heslop Harrison) and a few on South Uist (Outer Hebrides) on August 25. It was last seen fresh at Hove on November 4, after being common at Eastbourne up to October 18, when heavy rain drowned many.

Nomophila noctuella : There is some evidence of a mass immigration in the Bournemouth district. It was noted on schedules in small numbers at Poole from June 18, increasing to 25 on July 31 ; but at Bournemouth during the month ending August 25 " vast swarms were resting on heather and kicked up at every step in fresh condition and of both sexes " (Lt.-Col. F. C. Fraser). Apart from this 12 observers recorded 250 in the season, as compared with 60 by six observers in 1939. Notable observations were of a perfect specimen taken at Denham (Bucks) at the exceptionally early date March 24 (*Entom.*, **73** : 117). It appeared at Timoleague, April 25, in London on May 27, and in the Isle of Man, June 2. It was reported rare in Tyrone and last seen at Timoleague on October 23.

Aglais urticae and *Nymphalis io :* In fine summer weather both the Control insects were more abundant than usual, especially in the north, and observations recorded in schedules serve to mark the relative scarcity of the regular immigrants. Specimens of *N. io* were seen in Glasgow, Edinburgh, and areas up to latitude 56° N. Dozens of *A. urticae* were seen flying east at the Shipwash Light Vessel off Harwich on September 8 and a few had previously done the same there on July 16.

Plutella maculipennis : Hundreds appeared at Keiss, near Wick in Caithness, in July and their larvae destroyed a field of turnips. In August, larvae were found in " huge numbers " on the isle of Coll (Inner Hebrides).

Papilio machaon : Specimens were seen on the wing at Hastings

on May 31, Rye on July 24 and Herne Bay on August 5 ; and larvae were found on garden carrots at Wye (Kent) and Hastings, Battle and Hailsham in Sussex, from which emergences were obtained on July 30 (*Entom.*, **73** : 213). If these prove to be the lighter coloured Continental race, the earlier specimens may be regarded as immigrants and not strays from the Norfolk or Cambridge fens.

Danaus plexippus : A female of the North American type was captured by a boy (W. R. C. Matthews) on Putsborough Sands, nine miles north of Bideford (Devon) on November 4 in a S.W. gale whilst resting at 9 a.m., B.S.T. It lived in captivity, fed on Veronica, until November 24, the latest date recorded for the species in the British Isles. No eggs were laid. The specimen was seen moribund by Dr. F. R. Elliston-Wright on November 24. C. W. Bracken has presented the insect to Tring Museum. (See *Entom.*, **67** : 248 for previous record at Bideford.)

Nymphalis antiopa : Four records are given in *Entomologist*, **73** : 109, 161, 234—Tunbridge Wells March 31 ; Hendon April 23 ; Porlock (Som.) May 5 ; and Ware (Herts) August 24.

Celerio galii : One taken at Timoleague (Co. Cork) on July 17 on Valerian. (Mrs. G. E. Lucas, *Entom.*, **73** : 212.) Another taken at Catcleugh, Northumberland, on July 19 on Honeysuckle. (R. Craigs.)

Celerio lineata livornica : Two taken at Timoleague on April 27 and May 9. (Mrs. G. E. Lucas.)

Leucania unipuncta : A male seen at sugar at Timoleague on October 17, and another on November 15. (Mrs. G. E. Lucas.) (One had been recorded here on November 12, 1939.)

Leucania vitellina : One seen on ivy blossom at Timoleague on September 14. (Mrs. G. E. Lucas.)

Heliothis peltigera : A fresh specimen was taken on catmint at Wisley R.H.S. Gardens on August 17. (H. L. G. Stroyan.) Larvae in dozens were found near Lydd half-grown on September 10. (G. V. Bull.)

Heliothis armigera : One taken at Newton (Swansea) on August 28. (C. H. Tait, *Entom.*, **73** : 235.)

Cidaria obstipata Fabr. : A male Gem was taken at light on April 27 at Timoleague (Mrs. G. E. Lucas). Another was taken on October 20 in the Shipwash Light Vessel flying eastwards. (C. L. R. Turnor.)

Sympetrum flaveolum L. : The rare Yellow-winged Dragonfly was taken at Fleet (Hants) on August 5. It was a male. (A. W. Richards.)

Owing to absence or weather conditions, the number of dates upon which observations were recorded varies considerably. Some observers recorded Control insects whenever seen, others only when

TABLE OF COMPARATIVE ESTIMATES OF ABUNDANCE IN 1940.

Species.	England and Wales.						Scotland.	Ireland.
	S.W.	S.E.	W.	E.	N.W.	N.E.		
Vanessa cardui	FR	FC	FR	R—	FC	R—	C*+	FC
V. atalanta	FC—	FC	FC —	FR—	VC*	FC*	VC*+	FC
Colias croceus	C*	FR	*nil*	*nil*	R	*nil*	*nil*	R
C. hyale	R	R	*nil*	*nil*	*nil*	*nil*	*nil*	*nil*
A. atropos	*nil*	R	R	R	*nil*	*nil*	R	R
H. convolvuli	*nil*	*nil*	*nil*	*nil*	*nil*	R	*nil*	*nil*
M. stellatarum	FR	R—	*nil*	*nil*	*nil*	*nil*	*nil*	R
Plusia gamma	VC*	VC*	FR	C	C	FC*	C	VC*
N. noctuella	VC*	FC	*nil*	*nil*	FC	*nil*	VC*	R
A. urticae†	C	VC	C	FC	C	C	VC*	C
Nymphalis io†	FC	C	FC	FR—	FR	R	R	C

* Denotes only found very locally in such abundance.
† Control insects added from scheduled observations. For explanation of symbols used see *Entom.*, **67** : 14.

CRUDE TOTALS OF INSECTS RECORDED ON REPRESENTATIVE SCHEDULES, 1940.

Locality.	Immigrants.				Controls.		Observer.
	V. cardui.	*V. atalanta.*	*C. croceus.*	*P. gamma.*	*A. urticae.*	*N. io.*	
Keiss, Caithness	11	24	0	154	869	0	Sinclair Swanson (59 dates).
Wendling, Norfolk	0	47	0	114	319	89	A. H. Turner (100 dates).
Timoleague, Co. Cork	31	141	1	400	288	119	Mrs. G. E. Lucas (160 dates).
Stroud, Gloucester	36	233	0	1664	2869	182	T. B. Fletcher (171 dates).
Plymouth, Devonshire	5	41	89	3	100	7	F. W. Jeffery (59 dates).
Poole, Dorsetshire	9	40	9	131	160	22	Alan Bromby (83 dates).
Eastbourne, Sussex	114	84	27	500	unrecorded		C. H. Hutchinson (45 dates).

migrant species were entered. The schedules from Wendling and Timoleague are comparable for the same latitude, north of which schedules are lacking from many districts this season. In the most complete schedule, kept at Stroud, also appear 7 *M. stellatarum* and 10 *N. noctuella*; but *A. atropos* and *C. croceus* were not seen, though the latter was recorded in the Isle of Man (July 27–Aug. 22).

V. *Note on Phenological Observations.*

The dates of the first appearance at 80 other places of *Vanessa cardui*, *V. atalanta* and *Plusia gamma* will be found in Table IX now being prepared for the Royal Meteorological Society's *Phenological Report*, 1940. It also includes the earliest dates the fresh broods

of the Control insects, *Aglais urticae* and *Nymphalis io*, appear in the summer; and phenological observations of many common resident Lepidoptera, including *Pieris rapae, Callimorpha jacobaeae, Triphaena pronuba, Apamea monoglypha* and *Tortrix viridana*, which are listed as sometimes reinforced by immigration.

Records of the earliest dates of oviposition in the season by *Pieris brassicae* are desired for Tring Museum, addressed to Dr. Karl Jordan, F.R.S.

VI. *Observation of Migratory Locusts.*

Though no male locusts have been recorded in the British Isles since August-September, 1931 (at Cromer and Malton, Yorks), stray females appeared in the summer of 1938 at Pottersbury (Northants), Holy Island (Northumberland) and at Rousey (Orkneys). Again in mid-September, 1939, specimens were taken at North Ronaldshay (Orkneys) and North Mavine (Shetlands); the last was found in phase *gregaria* and probably arrived from the breeding ground amongst the reeds in the delta of the Danube, distant 1600 miles where an outbreak was developing in 1938, and will probably last some years.

Locusta migratoria migratoria L. has, therefore, been restored to the list of vagrant species for recording. It is requested that any specimens captured may be sent for examination to the British Museum (Nat. Hist.) addressed to Miss Z. V. Waloff, B.Sc., of the Imperial Institute of Entomology. (See *Bulletin of Entomological Research* **31**, Part 3, November, 1940.)

"Windycroft,"
Hastings;
February 1, 1941.

WARNING COLORATION.—Mr. Mackworth-Praed's remarks *re* warning coloration and distastefulness (*Entom.*, **74**: 7) call for comment. The conditions under which the observations were made were hardly such as would allow the calm and cool consideration desirable if selection is to be given full play. The members of a crowd of expectant birds awaiting the "release of all moths" when the window is opened would hardly be expected to do otherwise than dash at the first moth available in case someone else caught it. Under such circumstances, even if a Cinnabar, for example, were captured and carried away, the event would have little significance; it may not have been eaten, after all. The well-established principles of warning coloration require better evidence than this for their overthrow. The fact that a presumably distasteful insect is sometimes captured, or even eaten, does not invalidate its *relative* distastefulness. A great deal more must be known about the conditions in which such capture occurred: no inedibility is *absolute*.—(Prof.) G. D. HALE CARPENTER; University Museum, Oxford.

THE SYSTEMATIC POSITION OF *MNESIPATRIS FILICIVORA* MEYRICK.

By Albert E. Wright, F.R.E.S.

In 1938 I had the pleasure of breeding a number of the new British micro *Mnesipatris filicivora* Meyrick. The larvae were kindly sent to me by Mr. Bryan Bierne, of Dublin. In the *Entomologist* for 1938 (**71** : 143) is an account of my breeding experiences, along with a description of the larva. Mr. Meyrick placed the moth in the genus *Mnesipatris*, a division of Lamproniidae (see 1937 *Entom.*, **70** : 194) which would bring it near to our two species of *Incurvaria*, *I. pectinea* Haw. and *I. musculella* Fabr., or to *Phylloporia bistrigella* Haw. or the genus *Lampronia* of which we have eight species. A characteristic of this group is that the larvae mine the leaves or shoots of various plants and the ovipositor of the female is a strong cutting instrument for inserting the eggs therein.

Mr. F. N. Pierce, from his examination of the genitalia, considered that the true position of this species in our list would be with *Teichobia verhuellella* Stainton. I was very desirous to ascertain its proper affinities and so I went into our Grange Woods, where I had in previous years taken the larvae of *verhuellella*, and was successful on April 14 in finding them again. They construct a silken case in the spores of *Scolopendrium*. I have on many occasions examined the fronds of *Asplenium* which grows along with the hart's-tongue, but have never found a larva thereon. In this district they have a decided preference for hart's-tongue. The larvae of *verhuellella* are very local in my experience, and seem to have their particular corners ; generally I find them only in rock crevices and often under bushes. Where the hart's-tongue is more luxuriant, and in the open, I rarely find them. They seem to prefer damp and almost sunless localities. It is necessary, to preserve the existence of the species, that one should look over the fronds and not break them off, as the plant takes some time to develop good spores, and if they are removed the food for the succeeding generations is destroyed.

I have looked up all the books I possess, but apart from describing their habitat and the food-plants I can find no written description of the larva of *T. verhuellella*, so on the day following I examined one, and noted the following characters : The larva was difficult to extract from its chamber without damage. The silken domicile is thick and firmly knit together amongst the fructifications on the back of the fronds. When full fed the larva is round, and stumpy in build, 4 mm. in length, 1 mm. in width. Head, dark brown with number of fine light hairs. Second and anal segments each with a

brown plate, with scattered light hairs. The second and third segments much wider than head. The anal segment very narrow. Each of the other segments has a transverse line or furrow in centre dividing it into subsegments. These also have a few scattered hairs on side. Width from 3rd to 10th segments 1 mm. from the 10th tapering off sharply to the anal. The colour of the larva is light yellowish, slightly tinged with green, with no distinct abdominal line; legs well developed.

The larva is very different from that of *M. filicivora*, which is a flat larva with rudimentary legs, well suited to its environment, in feeding on the inner substance of the frond between the outer layers. It is a true miner, whereas *verhuellella* does not mine the leaf, but lives amongst the spores generally in or near the receptacle.

Having seen and bred both species I am convinced that *M. filicivora* is correctly placed in the Lamproniidae. When the moths emerge they rest with their wings arched down the sides of the body, like other members of that group, and are nearest in my judgment to *Phylloporia*. Of this genus Meyrick states: "The larva has the segments incised, legs hardly developed." It will therefore come next to *P. bistrigella* Haw. in our list.

There are slight differences in the structure of the imago which Meyrick defined, and caused him to erect the genus *Mnesipatris* for it. The only other species in the genus is a Japanese insect, *M. phaedrospora* Meyrick. *T. verhuellella* pupates in the silken larval chamber, whilst *M. filicivora* leaves the mine, and pupates in the earth.

Brunleigh,
Grange-over-Sands.

A Probable Migration of Pieris brassicae.—On July 14, 1940, while collecting on Bricket Wood Common, between Watford and St. Albans, I observed a flight of *P. brassicae*. At the time I was on an open path running along the side of the wood and had a clear view for about 100 yards on either side. Suddenly I noticed that large numbers of this butterfly were flying across the path in a direction approximately S.W. On looking eastwards towards the wood I saw hundreds more rising up and flying off in the same direction. The wind at the time was moderate and somewhat variable in direction, predominantly N.W. however. There were a few scattered patches of cloud, but the day was mostly sunny. This flight was observed at about 3 p.m. (B.S.T.) and lasted for about a quarter of an hour. Afterwards only a few stragglers were seen flying off in the same direction, while the majority of *brassicae* then showed no signs of making any attempt at uni-directional flight. I believe similar flights were observed in other parts of the country during the same week-end.—Neville L. Birkett, B.A.; The Cottage, Kilner Park, Ulverston, December 20, 1940.

LIBERATION OF BUTTERFLIES.

By Lt.-Col. Neville Eliot.

With all due respect to the memory of the leading entomologist concerned it would appear that the destruction of the Monmouthshire colony of *Araschnia levana* (*Entom.*, **73** : 213) is an example of personal prejudice rather than of scientific reasonableness. Judging from the records of over 150 years *A. levana* has never come naturally to England, and to prevent its artificial introduction would merely add further year-by-year confirmation of its incapacity so to do—hardly a point of scientific importance. On the other hand, the recorded, and watched, artificial establishment of a colony might well provide data of interest. If it maintained itself unsuitability of habitat could be written off as a cause of the insect not being indigenous, if it spread the rate of spread might be measured, if it died out the—probably climatic—cause might be determined. I wonder how the majority of entomologists would react to a deliberate destruction of Captain Purefoy's colonies of the Dutch race of *Lycaena dispar*? And yet the introduction of a once indigenous species may well give less information of interest than the introduction of a new one.

Man is part of the scheme of Nature. Whether he likes the results or not—and he generally does not—he is an agent, sometimes reluctant, often unconscious, for the transmission of insects from one region to another. The appearance of *Pieris rapae* in New Zealand was quickly followed by that of its parasite, a clear case of cause and effect. It would seem an unkind splitting of hairs to dignify the probable cabin boy who threw the infected cabbages ashore as a natural agent of transmission while stigmatizing the learned entomologist who provided the parasites as an unnatural one! Surely what is of scientific importance is not whether an insect has been deliberately or unconsciously introduced by man, but whether the facts connected with its introduction are known and recorded. *Hypolimnas misippus* is supposed to have been transported to the West Indies by African slave ships. Recently it has been argued that *H. bolina* came to Mauritius when, on the British taking possession, Indian coolies replaced the negroes working in the cane fields. The Indian *Pareba vesta* is not known in Malaya, but is found here and there down the Islands as far as Bali—as far, that is, as in the old days Indian colonization penetrated. *Vesta*, I believe, tends in Bali to a dwarf form, which has thus been evolved since the known dates when the island was in close contact with India, if the suppositions involved are correct.

New Zealand has "lebensraum" for many butterfly species.

Results of interest might accrue, though perhaps not for hundreds of years, from the introduction of one of the small Andean Argynnids, which may well have been on its way there in the good old days before the evolution of the disturber, man, could have been forecast. Mimosa (*Acacia* spp.) is pretty well naturalized on the Riviera: provided it is humanly speaking certain that economic damage would not result, why should not the mimosa-feeding Hairstreak from Southern Australia be introduced there?

Lepidopterists should agree ("Happy thought" as Punch used to say)—should agree, for their respective countries, what species, if any, might safely be introduced for research purposes. Experimenters who wished to try their luck openly and under surveillance could then expect the loyal co-operation of other lepidopterists, provided that their introductions were limited to the approved insects. Personally, for sentiment's sake, I think that the number of species approved for England should be strictly limited. Even were it possible, I should hate to see the haunts where the Aurelians admired the White Admiral or Lady Glanville pursued her Fritillary filled with the blue flappings of Morphos or the spectral glidings of Hestias: in fact the more varied, gaudy and outlandish the interlopers were the more unreasonably I should hate them.

So much for the introduction of alien species. The question of the artificial spread of indigenous species has also provoked much discussion. It seems doubtful whether what might be called the "normal" liberation of *Polygonia c-album* or *Limenitis camilla* has had any appreciable effect on the recent spread of these insects or has obscured the broad outline of its progress. I prefer to cherish a theory—cherish because it is so delightfully flimsy—that the winter feeding of birds by kind country dwellers may have helped the process by gathering round the table of charity birds which otherwise would have been famishingly scouring hedgerow and tree. After all, many more people indulge in the innocent pleasure of feeding birds than in the crime of liberating butterflies.

Admitting that some migrating species, such as *Vanessa cardui*, *Colias croceus* and *Macroglossum stellatarum*, are so widely and systematically recorded that "liberation" would be heinous, need all and every species be equally "taboo"? Why should anyone rush into excited publicity, either way, about the capture of a few *L. camilla* in Caithness? "But that's not fair argument" the confirmed Listophil may say; "I live in A-shire, next to County B, where there is a locality for a certain rarity, and it interests me very much to record its attempts to spread naturally across our border." It seems to me, however, that a good deal depends on what weight can be attached to the words "spread naturally," considering that

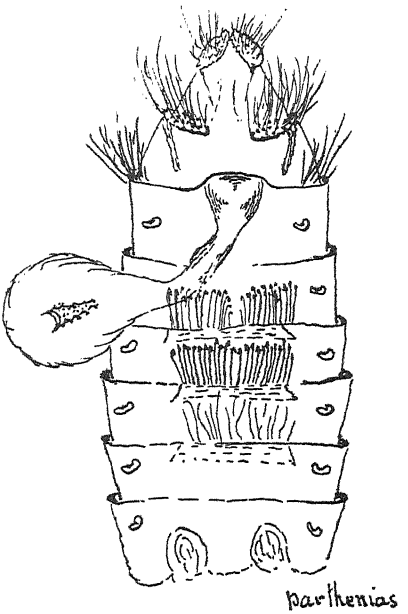
special localities are so continuously harried, and rarities so assiduously pursued, long series being collected year after year. Does that not work against natural distribution ? Letters on the same, and following, page of the *Entomologist* as that quoted above give instances in point ; *Papilio machaon*, for its conspicuous beauty and rarity, is everyone's prey. If country dwellers who like to see " pretty butterflies " in their gardens, if amateurs who like to try to establish rarities in their neighbourhood, are to reduce or forego their pleasures, and dealers their profits, at least let there be some compensatory sacrifices on the other side. Let a standard of entomological conduct be agreed upon which would not only control the liberation and introduction of Lepidoptera but also their destruction. Would it be too much to suggest that after breeding from rare captured females, a proportion of the perfected offspring should be liberated in the original or other suitable locality, whenever possible, that the making of unduly long series of some rarities should be discouraged, or other rarities be completely protected for certain periods of years, or in certain localities ? There should be little doubt but that if a general code could be agreed upon an overwhelming majority of individual lepidopterists, dealers, entomological societies and school clubs would gladly co-operate.

" UNUSUAL " BEHAVIOUR OF LYSANDRA CORIDON.—Regarding the correspondence in the *Entomologist*, **73** : 231, 258 and 277, the following notes based entirely on personal observation of the habits of our butterflies during the last 60 years may be of interest. Several species are attracted to the dung of animals and other liquids for the purpose of feeding, and on many occasions I have found them imbibing the more or less putrid juices from the remains of animals. I have frequently seen *Lysandra coridon* on cattle and horse droppings, also *Lycaenopsis argiolus*, as well as *Limenitis camilla* and *Pararge aegeria*. The first time I saw *camilla* on horse dung was as long ago as July, 1872, on a roadway leading through a wood near Ipswich. As is well known, *Apatura iris* delights in feasting on putrid animal matter ; *Polygonia c-album* will also feed on similar filth. During the very dry autumn of 1899, when wild flowers were withered and past by September, *Vanessa atalanta* was in great abundance ; they might often be seen drinking at puddles on freshly watered roads in streets of towns, which is also a common habit of all three species of Whites, also *argiolus*. I have found all our sixty-eight Butterflies will freely drink water sweetened with sugar, and the exuding sap of trees is very attractive. I remember the renowned Dr. A. R. Wallace telling me that the then unique specimen of the Calliper Butterfly he found in Borneo was drinking at a puddle of dirty water. A curious habit I have noticed of *Erynnis tages* is excreting liquid and imbibing it, by passing its tongue down between the legs. *Tages* will also feed on human perspiration.—F. W. FROHAWK ; January, 1941.

BREPHOS PARTHENIAS: FEMALE GENITALIA.

By F. N. Pierce.

I am at the present engaged in adding the female to my male mounts of the Genitalia of the Noctuidae with a view to publishing drawings of these in order to complete the genitalia of both sexes of the British Lepidoptera. I found the female of *parthenias* was exceptionally interesting as it showed a modification of the floricomus ovipositor found in the genus *Cosmia* of the *Noctuidae*, in *Euphyia* and *Theria* in the *Geometridae* and in *Cnephasia* in the



Female genitalia of *Brephos parthenias*.

Tortricidae. However, instead of following the usual form, i.e. the ovipositor set on either side with strong hairs and specialized club-like scales, the ovipositor has three pairs of hairs at either side and on the sixth sternite a plate bearing the club-like scales, which is repeated on the fifth sternite, whilst on the fourth sternite the plate bears only hairs. There is also an indication of a plate on the third sternite without either hairs or scales. The discovery of this modification of the floricomus ovipositor in *parthenias* made me impatient to see if it was present in its near ally, *B. notha*, but alas I had only males. Mr. T. Bainbrigge Fletcher came to my rescue and sent me mounts made by the late Rev. C. R. N. Burrows. These showed that *notha* had quite a different ovipositor, a long

telescopic apparatus without specialized scales and no segmental plates, but both species have a rather distinct form of signum. The males are very much alike. Mr. A. E. Wright has since sent me the only female in his collection, and this confirms Mr. Burrows' mount. This difference in the females got me wondering; then I realized that *Brephos* was only a parallel to *Cnephasia* in the *Tortricidae* and this character therefore a specific, not a generic, one. All the Cnephasias have the floricomus ovipositor except *incertana*, which has a telescopic ovipositor (Gen. *Tortricidae*, Plates III and IV). Thus it is evident that the method of egg-laying is quite different in the two species. In *notha* it would appear the eggs are laid down a crevice, whereas *parthenias* would seem to lay its eggs on a smooth surface and, because they are conspicuous, to tear off the scales from its body to cover them by means of the club-like scales, as recounted by Alfred Sich in *Tortrix viridana*. But all this is only theory on my part, and requires confirmation. Who will confirm or otherwise? *Parthenias* is apparently common, but has anyone seen the eggs? No mention is made of them by Meyrick, Barrett or Buckler though the larva is described. *Notha* is more local, but here is an opportunity for those entomologists living where the species occur to investigate and throw a light on the curious structure of a floricomus ovipositor. The species should be on the wing shortly.

The Old Rectory,
Warmington,
Peterborough.

NOTES AND OBSERVATIONS.

UNUSUAL BEHAVIOUR OF LYSANDRA CORIDON.—In reply to one of the questions put by Mr. H. Haynes in his note (*Entom.*, **73** : 277), as to why no other species are subject to the attraction of animal droppings, I can assure him that *Apatura iris* is so affected. I saw a freshly emerged male, with wings extended, on a fresh cow dropping, about 10 a.m. on July 14, 1935, in my meadow here, near some big oaks. It was there for a minute at least, before being disturbed by a dog.—Capt. A. F. L. BACON, M.A.; The Malt House, Burghclere, Hants, December 20, 1940.

UNUSUAL BEHAVIOUR OF LYSANDRA CORIDON.—As regards the notes given by Mr. H. Haynes in the *Entomologist* of December, 1940, I have noticed the same behaviour of *L. coridon* whilst collecting at Champéry on August 1, 1931. Males were swarming around ruts in a field, but females were completely absent and I found nothing likely to cause the attraction. Againat Limone (Piedmonte) in August, 1934, I noted the same behaviour, but on this occasion the butterfly in question was *Pieris rapae*.—H. G. HARRIS; 5, Archer's Road, Southampton, December 31, 1940.

PIERIS BRASSICAE 1939 AND 1940.—With regard to Brig.-Gen. B. Tulloch's note in the January *Entomologist*, the following observations may be of interest: In 1939 at Weedon I noticed that large numbers of *P. brassicae* larvae had travelled to the third floors of the Georgian pavilions used as officers' quarters. To do this they had climbed two 10-ft. walls, and proceeded in all a distance averaging 80 yards and climbed a mean total height of about 50 ft. One of the 10-ft. walls bounded their feeding-grounds, where not a leaf was left on the greens. A few only had pupated on the boundary walls and I noticed that about 10 per cent. of these had been stung. I took 200 pupae from the building and walls, including some which had been subjected to 25 degrees of frost and then been embedded in ice for 12 days. All these pupae came out successfully and there was no sign whatever of variation. Last year, in late October, I visited the boundary wall (the quarters now being occupied by A.T.S.), and found it swarming with the skins of larvae which had been stung by ichneumons. On 60 yards of wall I counted over 1000 of these and not one living pupa. On the exterior walls of the building I found only an occasional pupa. It appears that in 1939 very few were stung, and the strong and healthy larvae travelled, for some reason, great distances to pupate. In 1940, when the plague was even greater, practically all appear to have been stung, and the weakened larvae travelled on the average only about 15 yards before halting and succumbing to the parasites. Incidentally I noticed blue tits feeding very freely on the cocoons of the ichneumon.—(Major) A. EGERTON COLLIER, R.E.; R.E. Office, Weedon.

DEILEPHILA ELPENOR ON GODETIA.—On August 19 I found in my garden a nearly full-fed larva of *D. elpenor* feeding upon *Godetia*; it was of a very dark form. The botanical resemblance in structure to the willow-herb is very apparent, but I have not I think seen *Godetia* recorded as a food-plant. In my neighbour's garden there is a magnificent old honeysuckle, a mass of bloom every season, which no doubt attracted the insect, for I well remember that in my former London suburban garden I frequently took *D. elpenor* at honeysuckle about 9 p.m.—C. E. MORRIS; The Cottage, Lord Romney Hill, Maidstone.

OPORABIA AUTUMNATA IN KENT.—Between November 5 and 9 I took five specimens of *Oporabia autumnata* near Seal, Sevenoaks. I wonder whether it has ever been taken so far south before.—J. LESLIE FULLER; Copse Bank, Seal, Sevenoaks.

AN IRREGULAR COUPLING.—In view of Mr. H. J. Burkill's great experience as a field naturalist, it is with much diffidence that I venture to suggest that his record under this title (*antea*, p. 21) was much more likely to have been prompted by a case of a male Empidid with its prey than that there should have been an unnatural union between members of such widely diverse groups. That the capture of Tipulidae by *Empis tessellata* F. is no unusual phenomenon is evident from a study of the large bionomic collections of predators

and prey in the Hope Department of Entomology (Oxford University Museum), and from published records (e.g. Poulton, 1907, *Trans. ent. Soc. Lond.*, 1906 : 386–7 ; Parmenter, 1937, *Lond. Nat.*, 1936 : 52). It is indeed unfortunate that Mr. Burkill's attention was distracted by another insect as soon as the flies were secured. Had he then examined them more closely I feel confident his views on their relationship would have been modified. Incidentally *Empis tessellata* is referred to as a " Robber " fly in the note in question, whereas it is usual to reserve that name for the Asilidae.—B. M. HOBBY, M.A., D.Phil., F.R.E.S.; Hope Department of Entomology, Oxford University Museum, February 3, 1941.

AN IRREGULAR COUPLING.—On July 16 last, my attention was attracted by a lively struggle amongst the heather at my feet. A three-fifths grown bug, *Picromerus bidens* L., the sex not determined, had hold of a quite vigorous male *Leucania impudens* Hb. I boxed and put the pair in a cyanide bottle. When they were dead I found they were still united, and I mounted them in this position. Examination showed that the proboscis of the bug was inserted deeply amongst the scales of the anal tuft and between the vulvae of the moth. I suggest that an explanation of Mr. Burkill's " Irregular Coupling " is practically similar to that in the above instance, and that a gastronomic and not a sexual impulse was responsible for the phenomenon. *Empis tesselata* F. has as good a proboscis as the *Picromerus* and the fly is often seen with it thrust into its prey, giving at times a superficial impression of a pairing. Admitting that the forceps of the males of both the *Empis* and the *Tipula* are well developed and capable of a good grasp, such a sexual coupling as that proposed is extremely unlikely. Mr. Burkill says, " I had not paid any attention to the manner in which they were attached." I may add that *Picromerus bidens* is very common here, and it is surprising how quickly they reduce promising broods of the larvae of *Croesus septentrionalis* L., on birch and willow, to empty skins. They often attack these, and other larvae, in great force.—F. H. HAINES; Appleslade, Linwood, Ringwood, Hants, January 23, 1941.

MELANIC TENDENCY OF CERTAIN MOTHS IN THE FOREST OF DEAN. —For many years I have been accustomed to take the black aberrations of *Erannis leucophaearia* (ab. *merularia*), with the intermediate banded form, ab. *marmorinaria*, each spring in the Forest of Dean. The latter are extremely common, while the completely black specimens are plentiful enough to provide at least a dozen on a good evening at light. On similar occasions *Phigalia pedaria* is usually abundant, and here again the smoky-black ab. *monacharia* turns up in the proportion of about one in twelve to the type. I have noticed this local tendency to produce dark forms in other species also, notably in *Ectropis bistortata* (which ranges through all shades of brown almost to chocolate) and in *Erannis marginaria*, the males of which are appreciably darker than any I have taken elsewhere, while the rudimentary wings of the females are often completely black. I do

not know whether there is any explanation why these four species should show such a marked melanic tendency in this particular locality.—JOHN MOORE, Lieut. R.N.V.R.; R.N. Air Station, Arbroath, Angus.

LAOTHOE POPULI IN CAITHNESS.—The only previous record I had of this species was that of sterile ova found here in 1936. On June 16, 1940, my brother and I found eleven ova on a small poplar. Larvae emerged on June 23 and 24, and, growing quickly, went down to pupate from July 25 onwards. On August 25, on the same poplar, two full-grown larvae were found. One burrowed down on August 28 and the other ten days later. It is evident that all these larvae emerged from ova laid by the same female. The cold weather experienced last summer accounts for the outdoor larvae remaining in the larval state for twice as long as those reared indoors.—SINCLAIR SWANSON, M.A.; Keiss Village, Wick, Caithness.

RECENT LITERATURE.

A Key to the British Species of Plecoptera (Stone-flies), with Notes on Their Ecology. By H. B. N. HYNES, B.Sc., A.R.C.S., F.R.E.S. Freshwater Biological Association of the British Empire, Scientific Publication No. 2. 1940.

This work, the second of the Scientific Publications of the Freshwater Biological Association, will fill a long-felt need. It may seem strange, but for many years there has been no paper in English dealing with our Plecopterous fauna as a whole. Continental publications there have been, such as the *Süsswasser-fauna Deutschlands*, and the *Tierwelt Mitteleuropas*, but these suffered from the dual disadvantage of being in a foreign language and of including species not native to Britain.

Mr. Hynes's work is largely devoted to keys to the families, genera and species, and is illustrated by many excellent line-blocks of wings and genitalia. There is a useful introduction dealing with the position of the Order, structure, and methods of killing and preserving. A chart showing the recorded flight-periods is given, and Mr. Hynes concludes with ecological notes on the various species; these are largely based on his work done at Wray Castle, but the recorded habitats of the species elsewhere are given. A good list of references is also given, should workers desire to refer to the original publications, or to investigate any possible novelties to the British list. It may not, perhaps, be out of place to mention here that since the publication of these keys, Mr. Hynes has himself taken a species of *Protonemura*, which is not only new to Britain, but also to science. A note on this species will be published as soon as possible.

Mr. Hynes is to be congratulated on this handbook, and Plecopterists will await with much interest his next and more extensive paper on the nymphs of the British Plecoptera. D. E. K.

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LEPIDOPTERA NOTES, 1940.

BY C. G. M. DE WORMS, PH.D., F.R.E.S.

THOUGH the war has greatly curtailed all field collecting, I have thought it might be of interest once more to put on record a general survey of the past season as regards Lepidoptera, together with some account of my own activities, which were necessarily very much restricted.

At the outset it can be said that 1940 was a most remarkable year both for abundance of insects and, above all, for the amazingly long spells of fine weather throughout the summer. In both respects it approximated to other years of plenty in this century, such as 1911, 1921, and in particular 1933. The many collectors who go in for the moths must have greatly regretted being unable to make more of the periods of ideally warm nights for light work for which the season was noteworthy.

In spite of the incredibly cold spell in January, most of the early spring species were up to their normal time in appearance, especially *Erannis leucophaearia*, which was unusually plentiful in both sexes. The sallows were out if anything on the early side, as also were the insects which frequent them.

I did not carry out much collecting till the middle of April, when I visited the Cotswolds, where I did not obtain anything out of the ordinary. On the 20th of that month I went to Salisbury, where Mr. Pitman kindly conducted me round the neighbourhood. We followed in the footsteps of Mr. Bowes in finding a number of larvae and pupae of *Aegeria vespiformis* under freshly cut oak bark, as well as a few borings of *Æ. culiciformis* and *Æ. flaviventris* in birch stumps and sallow respectively, while larvae of *Panaxia dominula* were very numerous in the marshes.

On hearing of the unusual abundance of larvae of *Amathes ashworthii*, I travelled up to Conway for the week-end of April 27. During my two days on the Sychnant Pass I had no difficulty in finding all I wanted, feeding quite openly on short tufts of heather or gorse mainly in rock clefts. From these I bred a fine and variable series, as very few were stung. On the sandhills there were also still a few *Nyssia zonaria*, which had been swarming the previous week.

May ushered in the marvellously sunny weather, and butterflies

were well out on May 5 on the Surrey downs. These included *Callophrys rubi*, *Hamearis lucina*, *Pyrgus malvae*, *Erynnis tages*, and especially *Lycaenopsis argiolus*, which was commoner than for very many years. Among the moths which were on the early side I took *Drepana cultraria*, *Eilema sororcula*, *Bapta temerata*, *B. bimaculata*, *Cosymbia linearia* and *Semiothisa liturata*. About the middle of the month *Argynnis euphrosyne* and *Leptidea sinapis* were in good numbers in their haunts.

June opened with a very warm fortnight. On the 1st *Chlorissa viridata* was locally quite common near Chobham, while on the Guildford Downs posts again yielded many *Hadena conspersa*, and some *H. lepida*, *H. w-latinum*, *H. thalassina*, *Cucullia umbratica*, *Anaitis efformata* and *Eupithaecia venosata*.

On the 8th I went to Salisbury, which was to be my head-quarters for the rest of the season. The following day I visited the local woods in company with Mr. Pitman. *Argynnis euphrosyne* was still well on the wing. Beating oaks produced a good many larvae of *Drymonia ruficornis* and *Polyploca ridens*, while under willow bark along one of the rivers we found larvae and pupae of *Apamea fissipuncta* in amazing quantities. From these we bred a most variable series of this somewhat dull-looking insect.

During June I paid two visits to the New Forest. On the 18th I found larvae of the red form of *Orthosia gracilis* fairly commonly in tents made of the leaves of bog myrtle. Some were still quite small. On the 30th in glorious weather I made a tour of Parkhill enclosure with Mr. George Wateridge. *Argynnis paphia* was already well out, while *Limenitis camilla* was getting over at this early date. *Plebejus argus* was also past its best. Among the moths we flushed were *Eilema deplana*, *Sterrha muricata*, *Boarmia roboraria* and *Ortholitha mucronata* (*palumbaria*).

The early part of July was the only unsettled period of the summer. During the first week we found any number of stems of *Phragmites* containing pupae of *Nonagria geminipuncta*. Of the subsequent bred series the dark form predominated. On July 14 I was joined by Mr. R. E. Ellison, and we spent the day in the local woods where butterflies were plentiful, but by far the commonest was *Thecla quercus*. *Aphantopus hyperantus* was scarcer than usual. We were almost certain we saw at least one *Apatura iris*, which in other parts of the country was apparently as plentiful as in 1933, over 20 being seen on the wing the last day of June in one locality.

During the latter part of the month our chief objective was *Oria musculosa*, with the results described (*Entomologist*, **73** : 214, 241).

The whole of August was a succession of fine days and almost

the driest on record. Mr. Haynes and I concentrated chiefly on *Lysandra coridon*, which gave a very good show in several localities round here; and in one of which I do not remember seeing this species so plentiful. Aberrations were, on the whole, not so easy to come by as might have been expected from the numbers, though we obtained several good forms. *Lysandra bellargus*, on the other hand, which was over by the end of the month, was much less numerous than usual and no extreme varieties were taken. *Hesperia comma* appeared only in one of the *coridon* localities.

During this month among the larvae in this neighbourhood those of *Cucullia lychnitis* were to be found everywhere where the black mullein flourished, while *C. asteris* were equally common on golden rod in the woods. I heard later that during August *Catocala sponsa* turned up in remarkable numbers locally in the New Forest. It is a long time since this species has been so plentiful there.

September was also a fine month. Among its chief features was the abundance in some places of *Polygonia c-album*, the larvae of which were quite common on nettles, elm and hops during August. It is many years, too, since *Lycaena phlaeas* has had such a good autumn brood. In company with Mr. J. C. Craske I found a lot of ova of this butterfly on the Guildford Downs in early October. All were laid on very small plants of sorrel and had hatched by the middle of the month.

My last outing of the season took me, on October 11, to the Cotswolds, where Mr. Richardson and I had a good haul of the commoner autumn moths working ivy by moonlight. On the following day we visited the Forest of Dean area and beat out a number of *Sarrothripus revayana* from yews. Many of the Vanessids were still on the wing, in particular *Vanessa atalanta* and *Polygonia c-album*.

Though perhaps migrants were not especially in evidence, 1940, as has been emphasized, was in most respects a first class season, and it was indeed a pity that prevailing conditions prevented more being made of it.

12, Harcourt Terrace,
Salisbury;
December, 1940.

SECOND BROOD ARGYNNIS SELENE.—It may be of interest to record August occurrences of a second brood of the Small Pearl-Bordered Fritillary (*Argynnis selene*) in North Cornwall. On August 17, 1938, I captured a male of the species, somewhat worn, but not actually damaged, in Combe Valley, near Bude, which I presumed represented a partial second brood. This was confirmed in August, 1940, when on the 15th of the month I secured a freshly-emerged specimen, again a male, in perfect condition, near St. Ives.—K. P. WHITEHORN; 205, Hither Green Lane, S.E. 15.

THE NORTH-WESTERN RACE OF *ARICIA AGESTIS* SCHF.

By Albert E. Wright, F.R.E.S.

To my mind this is our most interesting butterfly, and I have had a long personal experience of observing its habits and studying its variation in our district. The Brown Argus is common throughout the area at the head of Morecambe Bay, which comprises several North Lancashire and South Westmorland localities, and may be said to be the headquarters of the North-Western race.

The type of land we get here is evidently very suitable for its welfare. The feature of the area is the fine crags of grey mountain limestone, which is very porous, dries quickly after heavy rain, and so particularly advantageous in the early stages of the life of *agestis*. The rock rose (*Helianthemum vulgare*) on which the larvae feed is very common, and in some places the uplands in June and July are covered with its delicate yellow flowers, with the butterflies sporting amongst them. In very hot and dry weather, they seem to prefer damper lower ground where bugle, ground ivy and *Viola tricolor* grow, no doubt seeking the moisture. Here they will often be found congregated together, visiting the blossoms during sunshine, and at sundown at rest on the long herbage and rushes. The females must of necessity return to the higher land for egg-laying purposes.

The butterfly appears to be single brooded; I have never seen or heard of any suggestion that it is otherwise in our area. I often go over the ground in August and September and even in the best of summers with plenty of sunshine and high temperature it has never put in an appearance. Tutt (*British Lepidoptera*, **11**) says: "In its North Lancashire and Westmorland haunts, Witherslack, Grange, Arnside, etc., this species seems generally to appear in June, earlier or later according to the season and to last till middle or end of July; we have found no records of August for these localities, but on the other hand in 1893 and 1896 it was taken on the 26th and 28th day of May." This quite agrees with my experience, but Tutt must have overlooked a record by Arkle, who reported a specimen at Arnside on August 14, 1906, although it is given in his list of localities later in the same work (p. 287). I have before me a record book compiled by the late Mr. J. Davis Ward who had a lifelong acquaintance with *agestis*, and he states therein that he took one at Grange-over-Sands on August 3, 1924, the latest date he had ever seen it here. I consider that this, and Arkle's record, are only indicative of a prolonged emergence of the first brood.

In the same volume of Tutt (p. 289) Arkle is quoted as saying that *agestis* is found on the mosses at Witherslack. This is contrary to all my experience. Only at one spot where the rock rose crag approaches the moss, and where an occasional specimen may have been wind carried, is it likely to have occurred. I have never seen one on the mosses, and they are very unlikely ground on which to expect *agestis*.

At Witherslack, in a forward season, males may be obtained towards the end of May, and both sexes in June to mid-July. At Grange-over-Sands the butterfly frequents higher land, and is consequently more exposed to the elements, and is usually about a fortnight later in putting in an appearance, though in 1939 I took a male on May 31—the earliest I have seen it here. Owing to the elevation it appears to have a more prolonged period of emergence, and quite fresh examples may be seen in July. I surmise that Mr. Ward's late specimen was obtained there.

The larvae are full-fed towards the end of April and early May. Some years ago I had a long search for them without result till I observed one being carried by an ant. This put me on their track and ants seem to be always associated with them.

In the *Ent. Rec.*, **17** : 268, is an excellent article by Prof. Harrison on his experience in finding the larvae, and he points out the ant association in the Durham and North-Eastern districts.

My acquaintance with *agestis* is a local one. I have never seen it elsewhere, except in North Wales, where I took some of the second brood in 1907. These were in excellent condition on Sept. 12. One of them was a fine female with a strong broad orange band, and is the best I have with this character so strongly developed. This North Wales locality appears to be the most northerly locality for the second brood, and it is strange that we never see it here where climatic and other conditions are quite as suitable. I have wondered if the strain of *artaxerxes*, which is single brooded and is undoubtedly present in our race, can have some effect on the single broodedness of our *agestis*? Wherever this mixture is present in England the insect is single brooded; elsewhere it is double brooded.

The best way to obtain *agestis* is to search the long grasses and rushes in the evening. They congregate together and are often accompanied by *Polyommatus icarus*, and they may be examined for underside variation without disturbing them. They seem to have favourite spots, and I have tried to fathom why these places should be so popular. I came to the conclusion that these resting-places would be the first to get the first rays of the sun the following morning, but have had to modify this to some extent in recent years, as I have occasionally found them where this would not

apply. I rarely find them under trees, where they would be likely to get drenched during heavy rain or a sudden downpour during the night.

Our North-Western race contains a good proportion of the "artaxagestid" forms—a term I use expressly to get away from the use of the name *salmacis*, which has caused so much trouble and confusion in the past. From my experience I must agree with Prof. Harrison, Mr. Carter and other North-Eastern entomologists who have specialized on this insect, that Stephens's *salmacis* is not recognizable. I have only retained the name for the form with a white discoidal.

In my opinion our insect has not so much of the *artaxerxes* strain or mixture as its North-Eastern counterpart. I have examined a long series of the latter, and it is apparent that they get more of the white spotted and intermediate forms than we do. This is probably to be accounted for by the high range of the Cumberland and Westmorland mountains on our side. They form a formidable barrier which would interfere with the meeting and mating of *agestis* and *artaxerxes* in our area. The butterfly I find is very rare in Cumberland; Mr. Routledge in his list gives a note of a few taken at Keswick many years ago, so it appears unlikely that it has come by that route, southward from Dumfries.

I consider it highly probable that the artaxagestid forms reached us from Durham, as they occur in many places in the intervening country. Four years ago I found it one afternoon at Crosby Ravensworth, which lies in the Durham direction, in north-east Westmorland. Unfortunately it came on wet, and I obtained only a few examples. These showed the mixture, and amongst them was the largest ab. *allous* I have seen. So possibly the Durham forms may have come by that route or by way of North Yorkshire.

Agestis is confined in Lancashire to our District and does not, so far as I am aware, occur south of Carnforth. According to Ellis's list as revised by Mr. Wm. Mansbridge it is also absent from Cheshire. Porritt's Yorkshire list gives it as an uncommon species, and most of the localities are in the northern area adjacent to Durham.

In size *agestis* does not vary with us to the same extent as *P. icarus*, or *Lycaena phlaeas*, my long series being fairly uniform. The largest is near 30 mm. and the smallest 25 mm. The latter I took at Silverdale, North Lancashire, on July 22, 1905. The average size is near 28 mm.

Upper Side Variation.

I have not seen personally or heard of any gynandromorphs having been taken here. Owing to the fact that the colouring and

pattern are the same in both sexes gynandromorphs would not be easily recognized, but I possess no example that would suggest a well-marked female on one side and an ordinary male on the other. In every case the orange spots are uniform on each side.

The ground-colour varies slightly from a dark brown to a lighter tint. Some of this may be due to earlier emergence and bleaching, but in quite fresh examples there is a noticeable difference in shade.

The spotting is very variable; many females show the full range of orange spots on both fore and hind wings; many males have a few spots on fore but the full range on hind wings. At the other extreme we get many entirely without orange markings.

I have one example, which may be regarded as pathological, in which the four lower spots vary on the right side. The lowest portion of the germinate spot is of the usual orange colour. The upper portion however is without the coloured pigment, as is the spot above. The next has a few scales at the lower corner; above this the next spot is divided by a streak without pigment; the remaining spots as usual. The effect is to give the lower spots a yellowish tinge. The hind wings are normal. Tutt (**11** : 232) mentions that "Holmes reports a ♀ of var. *salmacis* from the Kendal district with the orange spots on the right side much lighter than those on the left." The best insects in my collection, and so far as I am aware unique for Britain, are four var. *pallidior* Obth. I took one female at Grange-over-Sands on July 23, 1917 (see *Entomologist*, 1922, p. 111). This has the full complement of spots, but light yellow in colour. I took another this year similar in all respects at Witherslack, June 18, 1940. Another from Grange-over-Sands (June 15, 1940) is not so well marked, having only the three centre spots present on fore wings and the four nearest inner margin on hind wings. The other, taken June 13, 1940, also at Grange-over-Sands, is undoubtedly female, having only four small yellow spots on hind wings. The only other known example is in the British Museum and was taken at Skogstad on July 15, 1887, a Norwegian male from the Elwes Collection. This, being a male, has only the spots on hind wings present.

On July 2, 1921, I took at Grange-over-Sands a specimen, recorded in same note in *Entomologist*, of ab. *graafii* ver Huell. This was a male with white spots on hind wings, and three small white spots on fore wings. I took another very similar one this year at Grange-over-Sands on June 8, 1940. The only recorded specimens of this form are three from Holland taken between 1851 and 1859 (see Tutt, **11** : 232). What conditions produced these rarities last year I cannot comprehend. We had a very fine sunny spell at that time, and *agestis* seemed to come out quickly. They were

common from the first week in June, and were over so far as good examples were concerned before the end of the month.

In addition to examples possessing the usual orange spots on hind wings we occasionally take some with black spots between these and margin, but I cannot find any with an edging of white to them which would be referable to ab. *albisignata* Tutt. We often take, particularly at Arnside and Silverdale, and less frequently at Witherslack, the form with the black discoidal, surrounded by a white ring, ab. *albiannulata* Harr. For some reason this form is much scarcer in its Grange-over-Sands haunts.

Occasionally we take examples with the discoidal enclosed in a ring of blue scales. I have five examples of this aberration which are referable to *caeruleo-annulata* Carter & Harr. These were taken at Grange-over-Sands, Silverdale and Witherslack, so, though scarce, they are well spread over our area.

The white spotted discoidal forms are rarely taken and in this phase of variation we cannot compare with the north-eastern district. I have only ten examples, and some of these under a microscope reveal a few minute black scales near centre; one has a trace of black at the outer edge and not as a pupil. These have the underside spots smaller than usual, but pupilled. These are the nearest approach to *artaxerxes* on the upper surface that I have seen here.

I have ten specimens of ab. *allous* Hb. entirely devoid of orange markings and have given away others. *Semiallous* Harr. is common wherever *agestis* occurs. Three of the *allous* form appear to the naked eye to lack the black discoidal, being of a warm brown over all the surface of the fore wings, but under the microscope a dull area, certainly not of black scales, is seen to be present. In addition one specimen has a few scales on one side but not on the other. I refer all these to ab. *recessa* Carter & Harr. Tutt (*British Lepidoptera*, **11** : 247) gives a description of ab. *subquadripunctata* (Harr.) which occurs in Durham, and adds that it is also taken in Lancashire and Westmorland (Hodgson). Prof. Harrison and Mr. Carter in *The Vasculum* (**20** : No. 4) state they have seen examples in other collections from Witherslack. I have gone through my series carefully, and find some with a few white scales on hind wings. These are very faint indeed and can scarcely be discerned without the aid of a microscope. In another issue of *Vasculum* (**15** : No. 1) Prof. Harrison and Mr. Carter give reasons for the sinking of ab. *subquadripunctata*, and refer to this form under the name of *garretti* Carter & Harr. The form known as *albimaculata* Harr. is very rare. I possess five examples. These have the band of orange spots on hind wings followed by a white dash. Three of them are of the form *vedrae* Harr. on the undersides, but the others are quite normal.

Underside Variation.

We now arrive at what I consider the most interesting phase of variation in *agestis*. My personal experience here is that where the butterfly is most abundant the undersides are fairly constant and conform to type, but in a local colony generally near the limit of its range variation is much more likely to occur. This is certainly the case near Grange-over-Sands, and I have taken *vedrae* and forms approaching it only in one locality. I assume its occurrence here is due to inbreeding in this isolated place, which is the most western locality for the species, as the food-plant is not present further on owing to the change from limestone to other rock formations. I had a note only this year from a friend at Barrow, who had never seen *agestis* alive, and did not even know the rock rose. Barrow is not very far away from here and he has often worked the Cumberland coast but never seen it there, so *agestis* cannot have paired with *artaxerxes* on the coastal side unless conditions were very different in the past. This is additional evidence that our mixture came across country from Durham.

The ground-colour varies from light to a darkish grey, and from light to darker shades of brown. A good proportion have the orange spots well developed and forming a band which in others is very faint and almost obsolete. I have many strange combinations in the irregular spotting of the fore wings. About 35 per cent. have six spots in the series which, if the geminate spot is divided into two pupilled spots, gives a row of seven; most of my examples consist of five spots, the geminate spot being absent. The discoidal spot is present in every case. The variation in the number of spots in this series may be tabulated as follows:

Geminate spot divided, with two pupils	approx.	7½ per cent.
Six-spotted	35	,,
Five-spotted; geminate spot absent	50	,,
Four-spotted	5	,,
Three-, two- or less	2½	,,
	100 per cent.	

Asymmetrical specimens sometimes occur, and of these I have four, spotted as under:

Right wing 2 spots left wing 3 spots,
,, ,, 4 ,, ,, ,, 3 ,,
,, ,, 4 ,, ,, ,, 3 ,,
,, ,, 5 ,, ,, ,, 4 ,,

and also three specimens with 6 and 5, in which the geminate spot is present on one side only.

The undersides are very variable indeed, many having some large pupils and others faint. Only one specimen is referable to true *artaxerxes*. This I took at Arnside on July 24, 1935—a very late specimen. The discal spots are clear white without any trace of pupils, as are most of the other spots; only in one or two can small pupils be seen with the aid of a lens. On the upper side there are a few white scales inside the black discoidal. This shows the paucity of *artaxerxes* here as compared with its north-eastern haunts.

One specimen is referable to ab. *carteri* Harr. This has the discoidals immaculate, but with all the other spots pupilled. Other three are closely approaching this, having only a faint trace of black scales present in the fore-wing discoidal. I have several with the hind wings almost spotless, having only the central spot along with the streak white, and with a faint orange band present.

I have never seen any with spots coalesced, either on fore or hind wings as is commonly the case in *Polyommatus icarus* and other species of Lycaenids. The form known as ab. *brunnescens* Harr., of a warm brown colour, with the fringes divided, the inner half white, and the outer brown, also occurs here and I have eight examples of it. In the Grange locality I have taken eleven of the form *vedrae* Harr. These run almost parallel with *obsoleta* of *P. icarus*. This year I took only one of these. Often the spots on the fore wings are crowded round the discoidal (=ab. *glomerata* Tutt), rarely outward (= *discreta* Tutt). Several examples show the form *semivedrae* Harr. with the spots on hind wings inward from the streak wanting. Mr. B. H. Crabtree, F.R.E.S., informs me that he took ab. *obsoleta* Hodg. at Witherslack in 1902. This is very rare here. Prof. Harrison takes the same aberration in Durham and Scotland. In the isolated colony before mentioned I have seen single specimens of *vedrae* taken by others. My own series gives some curious varieties in spotting, the more extreme approaching *obsoleta*. They may be listed as follows:

No. 1: Only two spots present in the submedian row on the left side, and three on right. The hind wings without spots, only the discoidal and streak showing.

Nos. 2, 3 and 4: Fore wings with three small spots on each side, and only the spot near upper margin on hind wings present. This spot appears to be the most persistent, as it is present in all except two cases.

Nos. 5 and 6: Four small spots on fore wings, hind wings three spots.

No. 7: Five spots fairly large, but hind wings spotless.

No. 8: Five spots on left, the lower very small, without pupil; right side four spots; five small pupilled spots on hind wings.

Nos. 9 and 10: Five large spots on fore wings, and four small pupilled spots on hind wings.

I have carefully examined my series for a form reported from Durham, namely, ab. *codrus* Carter & Harr., which has a single additional spot with black pupil near the inner margin, inside the innermost row of four spots on hind wings, but have failed to trace it. A description is given in *The Vasculum* (**15** : No. 1), and the same name is there applied to other species showing the same character. I find it present in some of our female *P. icarus*, but not in *agestis*.

Some specimens have the streak on hind wings not triangular, but in the form of a narrow white line only; in others the streak is almost obsolete. In three examples a minute ray over the centre spot is all that is discernible.

The aberration in which the spots instead of being round are transversely lanceolate is far from common. I have a few showing this character (= ab. *elongata* Courv.) on fore wings.

A curious specimen taken at Grange-over-Sands on July 6, 1935, has the upper spot on fore wings moved far inwards, near to the discoidal. I have a number of the type with well-pupilled spots, and the usually white central spot on hind wings, with a strong pupil in addition. These have the ground-colour of a darker brown than in other forms.

Several have the spots very small (= *parvipuncta* Tutt); a few have large spots, chiefly those of the form with pupilled discoidals (= *crassipuncta* Tutt).

From the above notes the reader will see that we possess almost all the forms present in the Durham area, but not so many of the white spotted ones. The race of artaxagestids is much weaker here, no doubt owing to the fact that we are far away from Durham, where no doubt the race originated.

I sincerely thank Prof. Harrison for his kind help and advice, and Mr. William Carter for so kindly sending me photographs and magazines, which have been of great value to me in naming and tabulating the various aberrations. They appear to have thoroughly worked out all the forms of variation that appear in the North of England, and it will be difficult indeed to add to their list.

The following is a summary of the various forms in the north-western area :

agestis Schiff, common.
artaxerxes Fabr., very scarce.
semiallous Harr., common.
allous Hb., occasionally.
albiannulata Harr., frequent.
garretti Carter & Harr., rare.
obsoleta Hodgson, rare.
antero-obsoleta Tutt, local.
postico-obsoleta Tutt, local.
crassipunctis Tutt.

caeruleoannulata Carter & Harr., scarce.
vedrae Harr., not rare but local.
semivedrae, Harr., not rare but local.
brunnescens Harr., occasionally.
pallidior Obth., very scarce.
graafii ver Huell, very scarce.
elongata Courv, scarce.
parvipuncta Tutt.
discreta Tutt, occasionally.
recessa Carter & Harr., rare.
carteri Harr., rare.
glomerata Tutt, frequent.
albomaculata Harr., scarce.
salmacis Stephens, not common.
fumata Madd., occasionally.

DRAGONFLIES NEAR AN INDUSTRIAL TOWN.—On May 19 of last year I visited a small pond on the outskirts of Airdrie, Lanarkshire. There I saw three *Ischnura elegans*, two of them paired. A week later more *I. elegans* were seen, as well as some *P. nymphula*, and by June 2 the former species was fairly common.—SINCLAIR SWANSON, M.A.; Keiss Village, Wick, Caithness.

EAST KENT BUTTERFLIES IN 1940.—I made a few notes on butterflies observed in East Kent during last season. My time for such work being limited to week-ends, most of my observing has been in the woods, to the neglect of the open country. Nevertheless the following may be of interest:

Vanessa cardui, usually common in gardens, was late this year. I saw no migrants, and the first specimen observed was on August 11 at Kingsdown, where it was abundant later on.

Polygonia c-album.—A single example was seen in Chilham Woods on July 7, and a week later the same or another was in the identical spot, to which it continually returned. A few more were about then, and they appeared to be of the var. *hutchinsonii*, being lighter in colour than those found later in the year. Until 1939 I had only twice seen this insect alive. Last summer I found it in various localities around this district, and on August 17, near Betteshanger, had the great pleasure of seeing no less than seven perfect specimens in a pine clearing, all resting with expanded wings on a small patch of marjoram blossom, in company with two *Nymphalis io* and one *Vanessa atalanta*.

Limenitis camilla.—I was delighted to find a fair number of this species in Chilham Woods on July 7.

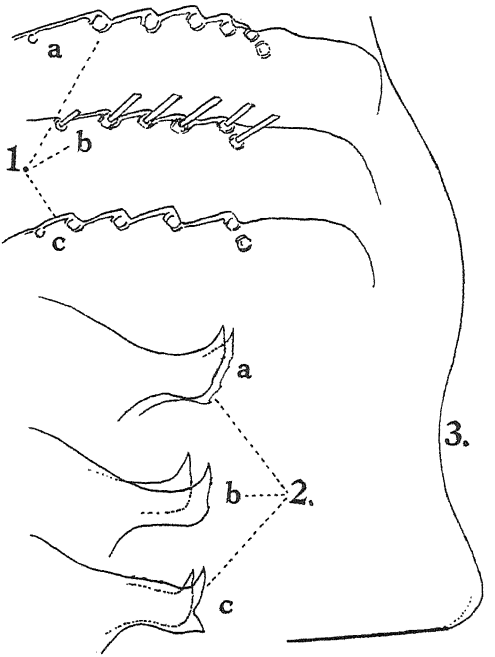
Colias croceus.—I saw one specimen at Kingsdown on August 11, but no more.—CECIL M. GUMMER; 31, Codrington Road, Ramsgate.

AUTUMNAL ARGYNNIS SELENE.—Mr. L. W. Newman's record (*Entom.*, **73**: 242) of an autumnal emergence of *Argynnis euphrosyne* is certainly unusual, but not unique. During the exceptionally dry and warm season of 1893 I had a brood of *A. euphrosyne* larvae, most of which entered into hibernation in July, the hottest weather, but a few of the larvae continued feeding rapidly and produced butterflies in August, all fine normal specimens.—F. W. FROHAWK; January, 1941.

A NEW RAT-FLEA FROM CHINA.

By Karl Jordan.

In a collection of fleas submitted by Miss Kuei-chen Li, National Kweiyang Medical College, there are five pairs of a new *Nosopsyllus* Jord. 1933 related to *N. nicanus* Jord. 1937, which latter is known only from South Fokien. The occurrence on the house-rat at Kweiyang of this new species instead of *N. nicanus* suggests that



Figs. 1–3.—*Nosopsyllus wualis* sp. nov. 1, dorsal margin of tergum VIII; 2, apex of paramere; 3; sternum VII of ♀.

a similar problem in systematics obtains in China as is known from India, where each faunistic district has its own *Nosopsyllus*, no two of the various species occurring together. All are easily confounded with *N. fasciatus* Bosc 1800, and may possibly all be equally important for Tropical Hygiene as vectors of disease. Before the distribution of these various *fasciatus*-like Indian and Chinese fleas is better known, it appears advisable to treat them all as specifically distinct.

Nosopsyllus wualis sp. nov. (Figs. 1–3.)

Frontal tubercle with sharp ventral edge.

♂. Dorsal margin of tergum VIII (Fig. 1) not curved down

immediately behind the long marginal bristles as in *N. fasciatus* and *N. micanus*, but continued for some distance more or less horizontally. Dorsal concavity of clasper broader, shallower and less rounded than in *N. micanus*. Tip of manubrium of clasper obtuse, not at all curved up and dorsally more rounded than ventrally. Apex of paramere (Fig. 2) dorsally dilated upwards as a sharp triangular tooth, ventrally rounded; margins with slight indication of denticulation; in one specimen the left paramere with triangular tooth also ventrally (Fig. 2, *c*). Remainder of the genital sclerites variable as in *N. micanus*, not presenting any distinction between the two species.

♀. Whereas in *N. micanus* the lower portion of sternum VII (Fig. 3) is produced as a broad and more or less truncate lobe, the corresponding lobe of *N. wualis* is short, narrow and rounded, the apical margin of the segment less incurved and above the wide shallow sinus much more convex than in *N. micanus*: bristles of this sternum more numerous, 34–37 (not countable in fifth specimen), in *N. micanus* 21–26; on lower area of tergum VIII, one side, 25–27 in *N. wualis* and 16–22 in *N. micanus*. In all five ♀♀ tergum IV with 2 apical spines on the two sides together, absent in four of our five ♀♀ of *N. micanus*. The apical spines of the metanotum and terga I-III or IV vary much in number in both species, the metanotum bearing on the two sides together in *N. wualis* ♂ 6 or 7, ♀ 6–10, in *N. micanus* ♂ 5–10, ♀ 6–8.

Type in Brit. Mus., 3 paratypes (inclusive of the ♀ from which Fig. 3 is taken) returned to Miss Kuei-chen Li, to whom I am very grateful for this contribution to our knowledge of the flea-fauna of China. The collection sent by her contained also a new bat-flea, the description of which will appear in another periodical.

Red Locust Control.—The recent Colonial Office announcement that A. P. G. Michelmore has been appointed to the new post of Locust Officer in Northern Rhodesia, and that he has been released from military service so as to be able to take it up, is very welcome news. The investigations of the Locust Committee point very clearly to there being a possibility that locusts could be controlled by action at their outbreak centres, once these had been defined. The discovery of the existence of these centres is almost entirely due to the labours of this Committee, and that it should have decided on the appointment of a watcher in one of the areas, in spite of the very great curtailment in the international support it has hitherto enjoyed, shows that it does not propose to let matters rest. No doubt the urgent need at this time to reduce locust damage by every means possible weighed heavily in the making of this appointment. Nevertheless the work which will fall to the lot of Mr. Michelmore is of great scientific interest as well, and will be closely followed.—N. D. R.

THE TYPES OF SOME GENERA OF PLECOPTERA AND PSOCOPTERA.

By D. E. Kimmins.

For the following generic names in Plecoptera and Psocoptera no genotypes appear to have been selected. In two the type fixation has been selected so as to make the generic name a synonym of an older, valid name.

Plecoptera.

Allonarcys Needham and Claassen, 1925, *Plecopt. N. Amer.*, **2** : 286.
Type by present designation : *Pteronarcys proteus* Newman ♂ (1838).

Cerconychia Klapálek, 1913, *Suppl. Ent.*, **2** : 124.
Type by present designation : *Cerconychia livida* Klapálek (1913).

Diploperla Needham and Claassen, 1925, *Plecopt. N. Amer.*, **2** : 286.
Type by present designation : *Perla duplicata* Banks (1920).

Leptomeres Rambur, 1842, *Hist. Nat. Ins. Nèvr.*, 457.
Type by present designation : *Leptomeres flaveola* Rambur, 1842 (= *Chloroperla tripunctata* (Scopoli, 1763)).

The above fixation makes *Leptomeres* a synonym of *Chloroperla* Newman (1836), which has the same species as genotype.

Psocoptera.

Cerastipsocus Kolbe, 1884, *Berl. ent. Zeit.*, **28** : 38 (**n.n.** for *Cerastis* Kolbe, 1883).
Type by present designation : *Psocus venosus* Burmeister, 1839.

Holoneura Tetens, 1891, *Ent. Nachr.*, **17** : 372.
Type by present designation : *Hemerobius unipunctatus* Müller, 1764. This fixation secures *Holoneura* as a synonym of *Mesopsocus* Kolbe, 1880, which has the same genotype.

Myopsocus Hagen, 1866, *Verh. zool.-bot. Ges. Wien*, **16** : 203, 210.
Type by present designation : *Psocus unduosus* Hagen, 1859.

Peripsocus Hagen, 1866, *Verh. zool.-bot. Ges. Wien*, **16** : 203, 210.
Type by present designation : *Psocus phaeopterus* Stephens, 1836.

Ptilopsocus Enderlein, 1900, *Zool. Jahrb.*, **14** : 150.
Type by present designation : *Ptilopsocus fuscus* Enderlein, 1900

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ON REARING LEPIDOPTERA.

By Frank Littlewood.

Introduction.

Among the evils the war has brought to the entomological world this contribution of mine may be counted as one.

War may have its nicer accidents too, however, and among such as have come my way I rank highly the unexpected opportunity it has afforded me of making a closer and personal contact with our Editor. On his return to London Mr. Riley was good enough to write to me suggesting that my notebooks on the Rearing of Larvae and Pupae, which he had only just had time to glance through while in Kendal, contained in his opinion enough of interest to make a serial for the *Entomologist*, and would I consider publishing.

As a matter of fact this paper was, primarily, not written for publication but for quite a different purpose—that of providing for myself a congenial and absorbing mental occupation to enliven a dreary and seemingly interminable convalescence following upon a series of unsuccessful operations, which had put a peremptory stop to my outdoor activities. From time to time, often at widely separated intervals, I had written and hoarded innumerable notes on this subject dear to my heart, adding, discarding, amending, till finally they were assembled in something like the present form. Then came a moment when it seemed a pity that the fruits of so much thought and labour should not be shared, for I had myself found an immense pleasure in reading similar matter in the entomological magazines. But diffidence, and indolence, prevented my making a move. I did get so far as to think that some day in the dim and distant future my notes might be offered to the *Entomologist*, but there the matter was allowed to rest. Now, when the editor has written to me in words that literally echo my latent thought there seemed to be nothing for it but to say "Yes."

It is impossible to make an article of this nature exhaustive, and it would be a disaster if one could. I am conscious of many errors of omission. Moreover, there is bound to be much that is in conflict with the methods and conclusions of other workers, for we all hug our pet theories. Nevertheless, I am hopeful that, here and there, I may have said something by way of comment or practical advice that will be of service to at least the younger readers; and there must surely be among the older ones some who, like myself, find interest and pleasure in discussing this fascinating and practical aspect of our hobby.

Cages for First Stage Larvae.

Newly-hatched larvae may conveniently be housed for the first week or so in one of the smaller sized metal glass-top boxes, obtainable from dealers in entomological apparatus. My own preference is for the 2-in. tin. It is quite big enough for early days when the larvae are very tiny, while not so roomy as to allow the larvae to wander far from their food and possibly starve. It is wise to use a new, or at least a reasonably clean, tin for infant larvae. An old rusty tin is an abomination for diminutive larvae often difficult to see. These tins must never be washed with hot water, which quickly removes the original lacquer and renders them immediately liable to rust. They may be wiped out with a rag or occasionally rinsed under the cold tap, and dried before further use. In such a confined tin it is of the utmost importance that the food should be perfectly dry, to avoid condensation, which will disable or drown the tiny larvae.

A further important use of these smaller glass-top boxes is for the storage of living ova, up till the time of hatching. The lid may be removed once or twice to renew the air supply, but I doubt whether this precaution is really necessary, as the amount of fresh air demanded by ova is very small indeed. Over-winter ova must be stored in a cool situation, such as a cellar or larder, and an eye should of course be kept on them when the time of hatching draws near.

After the first moult the young larvae are transferred to the more roomy "tumbler-cage," which, with me, has almost entirely superseded the larger sized glass-top metal box. While the latter has proved a boon to the breeder and in some ways is most useful, it has certain definite drawbacks that are not found in the tumbler-cage.

Tumbler-Cage.

The tumbler-cage may be briefly described as follows: In the first place, the tumbler itself is not the ordinary deep table tumbler, but that special dwarf variety which is sold with the old-fashioned bedroom water bottle or jug. It is $3\frac{1}{4}$ in. deep and $2\frac{3}{4}$ in. wide, practically straight-sided and made of strong but clear glass. In use, the mouth of the tumbler is covered with a small lid of glass—a washed lantern-slide makes a handy ready-made cover. The latter has four tiny blocks of cork glued to its underside and fitting outside the rim of the tumbler, to prevent the cover-plate slipping when the cage is moved. In this, its simplest form, the tumbler-cage is completely closed and as airtight as a metal box. For young larvae of many species nothing more is required.

But although the very minimum of air is demanded by many kinds of young larvae, there are certain exceptions, e. g. *sociata*, *unidentaria*, *cervinata*, etc., that are prone to "sweat" even from the first, and sweating is a condition that leads to disease and one that must be guarded against. For this reason a few of my tumbler-cages are fitted with an easily constructed ventilated cover, made as follows:

A narrow ($\frac{1}{2}$ in.) band of flexible cardboard (a thin postcard will do) is cut to fit snugly around the rim of the tumbler, its ends being joined together by gummed paper. A piece of fine "lawn" —a material like muslin, but more closely woven (an old white handkerchief will provide it)—is stretched over and glued on the band. A further strip of gummed paper all round completes the job, and the whole makes a strong and convenient slip-on lid, as easy to remove and replace as that of a pillbox.

This cover is really very little trouble to make, and is well worth the making, for the saving in time and temper later on is considerable. The older and more primitive type of cover—merely a bit of loose muslin tied over the mouth of the tumbler or held in position by an elastic band—is an abomination in actual practice. Elastic bands have an inconvenient habit of perishing with age, and even whilst new and strong they are apt to fly off as the cover is being lifted, and injure any larvae that may happen to be resting on the underside of the muslin. Such ventilated tumblers are better enclosed in a roomy tin box, closed by a glass lid. This arrangement keeps the food fresh and prevents condensation on the inside surface of the tumbler-cage. Indeed it provides a nice compromise between the two methods of rearing, the close and the open, and combines the good points of each.

The direct rays of the sun must not be allowed to fall on tins, tumblers, or in fact any cage of which glass forms a part. The concentrated rays would quickly kill the contained larvae. Species that benefit by sunbathing are housed in wood and muslin cages.

The principle of this tumbler-cage is by no means new. So far back as Stainton's day, 1852, gallipots, pickle bottles, jam jars and glass cylinders were used for larva-rearing. Arkle, in 1890, described a tumbler-cage, but he, presumably, employed only the ordinary table tumbler (which is really much too deep for convenience of cleansing), and used the primitive loose muslin cover held in position by an elastic band, a piece of glass being laid over a part of the top. Mansbridge, 1919, had discovered the disadvantages of the tied-on muslin and the unreliability of elastic bands, and had devised a band cover (but for a bottle-cage, not a tumbler) similar to that described above, only with paper instead of flexible cardboard. All that I claim for my own tumbler-cage is that it is

a neat development of the earlier ideas. Its shape, size, and its clear transparent glass make it a prettier cage than is an ordinary coarse glass jam jar. The small stout bedroom tumbler recommended here is much easier to clean out than the deeper table tumbler ; and it has over the latter the advantage of straight sides, which make possible the accurate fitting of a slip-on lid. whilst the lid itself is a great improvement upon the old-fashioned muslin cover held only by string or elastic. The tumbler-cage has all the advantages of the glass-top metal box, and more, without its drawbacks. It is vastly easier to clean and sterilize ; it is infinitely superior for observation purposes—one can view the contents from any side and without removing the lid. Finally it is cheaper, costing to-day only 3d. against 7d. for a metal box of equal capacity.

Simple Implements Needed.

The implements needed for the handling of larvae are few and simple :

1. A small, really soft (preferably sable) paint brush. The cheaper so-called camel-hair brush is not soft enough for touching infant larvae.
2. A teaspoon, which has had its edge filed thin and smoothed.
3. A pair of straight forceps.
4. A pair of small embroidery scissors, for snipping off leaves, etc. A pair of special pruning scissors is useful to deal with the thicker stems of food-plant.
5. A larger brush, the kind known as " sash-tool," for brushing out frass from tins, etc.
6. A small " cook's " metal sieve, with assorted meshes (obtainable from any ironmonger) is very useful for riddling peat soil and silver sand, for the pupating compost.
7. A small scoop, or a tablespoon, for filling pots or cages with the compost.

Cottonwool is required for plugging the cage-tubes, and a small assortment of muslin, net, or leno should be at hand.

Treatment of Ova and Newly Hatched Larvae.

Ova, as already stated, are kept from the time of deposition up till the time of hatching in a small-sized glass-top metal box. If of over-winter kinds they are stored till then in the coolest situation that can be found—in my own case in the cellar. In default of a suitable cellar or a cool pantry, an outhouse will do, the idea being to delay hatching until the appropriate food-plant is available. They are examined frequently as the hatching date draws near, for mild weather following on a frosty spell will bring out many species

in advance of their proper time; and it is an annoying experience to find that a whole brood has hatched and been starved for want of timely attention. This premature hatching occurs regularly with the Oporabias. But sometimes it happens that only a few of the eggs hatch prematurely, the remainder dribbling out over a period of perhaps weeks.

These unseasonably early larvae may have to be fed entirely on the unopened buds, which may be split open with the point of a penknife. And if a branch of the tree is cut and kept in water in a warm room it will not be long before the buds will open naturally and provide a sufficiency of food for the first needs. The month of April is the favourite hatching-time for the bulk of over-winter ova, and by then, as a rule, young leaves are available. In the ordinary way hatching coincides at this time of year with the opening leaves.

Some kinds of ova change colour just before hatching, usually assuming a leaden tint. When this warning has been given the batch should of course be kept under close observation. Other kinds may give no hint at all, so that when the due hatching season draws near it is never really safe to leave them long without a glance.

Whether any food-plant should be put into the tin in which ova are just hatching is a point that does not seem to have been determined. Davies, in a useful little handbook, said, *not*; and my own experience leads me to believe that he is right, in the main. Other authorities hold exactly the opposite view, and even go so far as to recommend that ova be placed on damp flannel, or that a drop or two of water be put into the box with the ova to prevent the shells from becoming too dry for the little larvae to break through. The probability is that different species require different treatment in this respect, and only experiment can say what. In my own experience there have been certain kinds of ova which certainly hatched better after being placed on damp moss. On the other hand many kinds either failed to hatch at all, or a big proportion of the ova failed, when food-plant, even in small quantity, was included in the same tin.

If only it is safe, it is certainly very convenient to put a morsel of food in the tin along with ova that are hatching, for then one need not be in quite such a hurry to remove the larvae to proper feeding quarters—a separate tin or a tumbler-cage as the case may be. Each morning one will find them collected on the food, which may be lifted out bodily with its little cargo of larvae, and a fresh bit put in. This method spares a lot of work in picking out individual larvae, and it is a plan I have followed with complete success on occasion, the proportion of unhatched eggs being no greater

than in tins where no food had been introduced. But it does not always work. In any case the amount of food put in at this stage must be very small indeed—only a fragment of tender leaf. It is there not so much as a pabulum as a collecting device, to facilitate the removal of the newly-hatched larvae to the feeding-cage proper. Generally, infant larvae wander restlessly about for the first few hours and do not seem to require food immediately. This applies particularly to tree feeders, the eggs of which may have been laid in niches in the bark. The tiny larvae have in such cases a considerable distance to travel before they reach the growing leaf buds, and provision has been made for the delay. Some kinds eat the vacated egg-shell for the first meal, and indeed require to do so, therefore none should be removed at all until they have left the vicinity of the empty egg-shell and plainly shown that they do not mean to eat it.

Where ova hatch uniformly and quickly they present no difficulty, but there are some that hatch irregularly, a few each day over a period of many days and even weeks. These give more trouble. The tin must be looked at every day and any larvae that are there removed to another tin. The transfer of those that have not considerately attached themselves to the scrap of food provided is accomplished by very carefully sweeping them off into the other tin with the soft brush. This must be done with due care, for a larva at this stage is a delicate little being and may easily be injured by rough treatment. Odd larvae may be picked up on the tip of the brush and gently scraped off against the food-plant in the feeding-tin.

Feeding Routine.

The following directions apply equally to tin and tumbler-cage, whichever happens to be favoured. Personally I like to transfer my young larvae to the tumbler-cage at an early age, and frequently dispense with the glass-top tin entirely, especially if the brood is a fairly big one. But if the larvae are few in number they may stay in the tin for a longer time.

A small quantity of food only is put in the tumbler-cage, and just at first it is necessary that buds or very tender foliage be supplied. On the third day a little more fresh food is put in, on the top of the old, and the larvae are themselves allowed to find it. Most of them will have done so by the following day, when the latest food with the larvae attached is lifted out with the forceps and put into a second tumbler-cage. A morsel of fresh food is again put into the original cage, and, by the next day, the few remaining larvae ought to have found it and may be taken out in

the same way to join their companions in the second tumbler. Laggards are removed with the brush and the now empty tumbler is washed out. The same procedure is repeated each day, or perhaps each alternate day, so long as the larvae remain in the tumbler-cage.

For larvae such as those of the Taeniocampids, which burrow right into the buds at first and will not forsake them until they simply cannot help doing so, when the food may be decayed and even mouldy, this method of feeding cannot be carried out so completely, and a dirty cage may be unavoidable. Probably for such awkward species, sleeving on the growing tree is the simplest solution. A cut branch of, say, whitethorn will, however, last a long time in water at this time of year when full of sap, and sleeved, or even unsleeved, on it the young larvae would be perfectly safe and happy until they had left the buds and come out into the open, when they could be fed on in the tumbler-cage. There is little risk of their straying from the food at this early stage; their inclination is to get out of sight in the heart of a bud and stay there as long as it will provide them with a meal. When it fails they simply attack an adjacent bud.

(To be continued.)

NOTES AND OBSERVATIONS.

Butterfly Books Destroyed by Fire.—Readers will be sorry to learn that in a recent air raid the whole of the publisher's stock of F. W. Frohawk's *Complete Book of British Butterflies* and his *Varieties of British Butterflies* were destroyed by fire resulting from enemy action.—N. D. Riley.

Butterflies Attracted to Dung.—I was interested in the account of Mr. Neville Birkett in the *Entomologist*, October issue, and others in November, of the behaviour of *Lysandra coridon* in visiting patches of dung. I personally have never seen that species, and can add nothing concerning that insect, but in September, 1937, I was surprised to see *Vanessa atalanta* had the same depraved taste. During a warm sunny afternoon I observed *atalanta* in the roadway opposite my house frequently visit new droppings of horse-dung, I suppose for the moisture it contained. There is a Buddleia in the garden nearby which is frequently visited by *io*, *urticae*, *cardui*, *atalanta* and the Whites, and one would have expected *atalanta* to have preferred this. Whenever she was disturbed by passing traffic *atalanta* flew around, but immediately it had passed she was ready, and paid the dung many visits during the time I had her under observation.—A. E. Wright; Brunleigh, Grange-over-Sands, November 30, 1940.

AGLAIS URTICAE EATEN BY FLYCATCHERS.—In 1936, towards the end of July, some friends were staying with me, and they called my attention to a pair of birds which were perched on a cable that is directly over the Buddleia bush, and they informed me that they kept darting down and taking the butterflies that were flying round, or were at rest on the blossoms. They were spotted flycatchers (*Muscicapa grisola* L.). We watched them for some considerable time afterwards and they must have taken a score of *Aglais urticae* whilst we were watching them. Not in a single case did we see the insect escape and they must have swallowed all the lot, including the wings, as we saw no fragments fall, and could see no trace on the bush or underneath. I have seen single butterflies taken before, but never the quantity that were consumed on that occasion.—A. E. WRIGHT.

VANESSA IO AT SUGAR.—For the first time in my life I have seen Peacock butterflies on a sugar patch. I always keep "sugar" going in order to watch the Red Admirals and Commas which are very greedy for the mixture, but I have never before seen Peacocks come anywhere near. However, this year, having started on that path, they went further, and managed to get inside my special bottle filled with a wasp catching mixture, mostly stale beer and jam skimmings. I had to rescue the Peacocks from getting drowned in this special brew. And whilst watching this new sight of Peacocks on a sugar patch, a Comma butterfly settled to sun itself on one of my legs and a Red Admiral on the other! A clear case of familiarity breeding contempt!—B. TULLOCH (Brig.-General); Hill Court, Abergavenny, September 29, 1939.

GYNANDROUS CONISTRA VACCINII.—An unusual specimen of *C. vaccinii* appeared among a brood reared from S. Devon ova in 1940, and the following description may be of interest: Left anterior wing very dark red brown, inner and outer transverse lines, costa, and nervures heavily shaded hoary grey, dark basal reniform spot merged in ground-colour. Right anterior wing dark ochreous brown, inner and outer transverse lines, costa and nervures red brown without hoary grey scales, dark basal reniform spot showing boldly against the ochreous ground-colour. Right posterior wing with ground-colour, nervures and cilia much paler than those of the left posterior. The specimen appears to be right side ♂, left ♀.—P. P. MILMAN; "Cyprina," Paignton.

ATTEMPTED SECOND BROOD OF ARCTIA CAJA.—Last year I reared six larvae which emerged from ova of this species late in July. From the start two of these larvae grew more quickly than the others, and they reached their last larval stage on August 26 and 27. By September 23, when the others had started hibernating, these two had commenced spinning, and they pupated without making cocoons on October 1. Recently, seeing that the pupae were dead I opened them, and found fully-formed imagines inside.—SINCLAIR SWANSON, M.A.; Keiss Village, Wick, Caithness.

LEPIDOPTERA IN GLOUCESTERSHIRE AND WORCESTERSHIRE.—A few days' sick leave recently gave me leisure to rearrange my collection and look up some notes I made during the seasons 1938 and 1939. They refer to collecting done in the Pershore district of Worcestershire, with occasional trips farther afield to Wyre Forest, the Cotswolds, and the Forest of Dean; and while none of the species concerned is a rarity, there are some which I had not noticed in the district before, and the following may be worth recording: *Clostera curtula* (Croome Perry, Worcs, at light); *Tethea ocularis* (two bred from pupae found among dead leaves at the foot of a poplar, Pershore); *Polyploca ridens* (fairly frequent at light, Pershore and Forest of Dean); *Endromis versicolora* (males flying freely, Wyre Forest, March 31, 1939); *Orthosia miniosa* (fairly common at sallows in several Gloucestershire localities); *O. populeti* (at sallows among aspen, Pershore); *Jodia croceago* (at sallows in the Forest of Dean); *Tiliacea aurago* (one larva beaten from maple, Tiddesley Wood, Pershore); *Hypena rostralis* (Croome Perry); *Minoa murinata* (Hay Wood, Newent); *Ecliptopera silaceata* (several specimens, Pershore); *Epirrhoë tristata* (near Speech House, Forest of Dean); *Hydrelia testaceata* (Daglingworth, Cotswolds); *Selenia tetralunaria* (Symond's Yat); *Plagodis dolabraria* (Tewkesbury); *Cepphis advenaria* (Cranham, Glos).—JOHN MOORE; Lieut., R.N.V.R.

FOOD-PLANT OF CALLIMORPHA JACOBAEAE.—My experience has been that these larvae usually resort to *Tussilago farfara after* they have devoured all the *Senecio* within reach, and that these larvae prefer *Senecio* to *Tussilago* in captivity.—P. P. MILMAN; "Cyprina," Paignton.

MOTHS AT HEADS OF PHRAGMITES.—In a note in the January number (**74**: 19) C. G. M. de Worms calls attention to this attraction. I have long found investigation of reed heads a profitable method of collecting at night, both near Gloucester and in the Oxford District. Success seems to depend largely on the coincidence of the flowering of *Phragmites* with the main emergence of the September insects; and this coincidence does not happen every year. The reeds are attractive only when full of pollen. They are so only for a short time, and are liable to be rendered useless by heavy rain. But in a favourable season most moths appear to prefer them to sugar, and very large numbers can be rapidly examined for varieties. In addition to the species mentioned in the note, I have taken the following in this way: *Agrotis segetum*, *A. puta*, *Peridroma porphyrea*, *Amathes umbrosa*, *A. xanthographa*, *Aporophyla lutulenta* (commonly), *Phlogophora meticulosa*, *Gortyna flavago*, *Arenostola pygmina*, *Rhizedra lutosa*, *Atethmia xerampelina* (once), *Omphaloscelis lunosa*, *Cirrhia icteritia* (including var. *flavescens* Esp., commonly), *C. gilvago*, *Hypena rostralis*, *Calothysanis amata*, *Lygris testata*, *Dysstroma truncata*, and several Tortrices.—R. F. BRETHERTON; "Merifield," Cumnor Hull, Oxford, February 2, 1941.

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MORE HEBRIDEAN DAYS. III: THE ISLES OF TIREE AND GUNNA.

By J. W. Heslop Harrison, D.Sc., F.R.S., F.R.S.E.

Unless one has visited the Islands of Coll and Tiree in May and early June, it is difficult indeed to realize how beautiful they are, and how delightful the weather can be. Still, some idea of the position may be gained when I write that the May sunshine records for Tiree are second to none in the British Isles.

The season of 1940 proved no exception, and one hot morning in the beginning of June, with the fixed intention of completing our investigations along the north-west shores of Tiree and on the Isle of Gunna, we set out from Scarinish along the road to the Tràigh Mhor. Almost immediately our work began, for flitting along the roadside probing the dandelion and other flowers were fine examples of *Aglais urticae*. Soon our attention was diverted from these as queens of the Hebridean Bee, *Bombus smithianus*, buzzed past, bent either on searching for a suitable nesting site or on visiting the *Lotus corniculatus* and *Anthyllis vulneraria* blossoms with which dune and pathside were alike bedecked. In examining the manoeuvres of one of these, we caught sight of a single male *Hepialus humuli* clinging to a dock stem. However, neither this, nor any specimens encountered subsequently, varied a hair's breadth from ordinary Durham types. It was therefore left, as were also the larvae of *Arctia caja* hard at work punishing the dock leaves.

A day or two previously to this, two members of my party had announced seeing "Green-veined Whites" near Dun an t'Sithean, and this statement I was very anxious to check. Although we knew that *Pieris napi* was very abundant on Coll and Gunna, we had been driven reluctantly to the conclusion that it failed on Tiree. My satisfaction was therefore great when I had the good luck, not only to find it in small numbers amongst a colony of *Cardamine pratensis*, but also to observe it in a newly emerged condition. Thus were demonstrated two facts: (1) That *Pieris napi* did occur on Tiree, and (2) that it was a genuine native and not an immigrant.

Skirting the Tràigh Mhor, and noting further *Bombus smithianus* on the dunes, now accompanied by *B. hortorum*, we struck north-west across the marshy moorland on which lay Loch Dubh. Around

its shores the dragonfly *Libellula quadrimaculata* was not rare. In addition, the Whirligig Beetle, *Gyrinus minutus*, span round a long finger of water striking far across the moor. Very abruptly the ground became broken and rocky, and the scent of thyme-clad banks revealed their presence as we crushed across them. From these fragrant beds we kicked up odd *Pyrausta purpuralis* with which flew innumerable *Phlyctaenia fuscalis*. One unusual capture secured here was *Colostygia salicata*. Hereabouts, too, *Ematurga atomaria* abounded and, moreover, immigrant *Plusia gamma* and *Pieris brassicae* sped before us. Then a real tragedy occurred. As we veered toward An Cnap a Fritillary fluttered along which, without capturing it, I carelessly noted as *Brenthis selene*. Later in the day, as will appear subsequently, I was ruefully compelled to conclude that I had despised the first *Euphydryas aurinia* that had ever been seen by an entomologist's eye on an island which, biogeographically speaking, had affinities with the Outer Island group.

Nothing new turned up until Vaul Bay was reached, save larvae of *Colostygia didymata* taken from primrose flowers on the rock faces. On the bay, *Polyommatus icarus* and *Epirrhoe alternata* were observed occasionally, as were also the usual bees. At one point, however, attracted by an old flint chipping station and by fragments of prehistoric pottery, I scrambled down the seaward face of the dunes. There, on an exposure facing the sun, my eyes were drawn to undulating movements on the bare roots of the Marram Grass. These, on closer inspection, resolved themselves into the rapid and never-ending wanderings of countless larvae of *Nyssia zonaria atlantica* and of *Actebia praecox*. Some of the latter were taken home and reared, to yield, however, the most ordinary forms.

Pressing forward now in the direction of Salum, we entered a very barren stretch of sandy moorland which continued to produce species already enumerated, with *Phragmatobia fuliginosa* and *Parasemia plantaginis* to add variety to the bag. The facies of the latter two insects call for no special comment.

As the day was now advancing we hurried on to Caoles, near which, as on the previous day, *Vanessa atalanta* and *Pieris brassicae* were very plentiful, with *V. cardui* in smaller numbers. Here, along a farmhouse wall, seemingly a great attraction to *V. atalanta*, a single *Xanthorhoe fluctuata* was netted.

Our course now lay toward Port Chunn Neill, where we took a fishing boat and were soon spinning across the Sound of Gunna. Some difficulty was found in landing, but finally, after struggling over a long stretch of steep, slippery seaweed-clad rocks, we scrambled ashore at the head of a little bay. This passed imperceptibly into a marsh, glorious with a brave array of irises and no fewer than five different species of orchid. These, as will be

obvious, had to be subjected to careful study, and this added *Arctia caja*, in the form of full-grown larvae, to our Gunna list, as well as a fine female *Cidaria truncata* var. *commanotata*. The latter, in addition, provided us with our first Hebridean record for the variety. Fluttering about also were numbers of *Pieris napi*—a great contrast to their scarcity in Tiree.

To the left a precipitious rocky slope invited exploration from the fact that it supported the Burnet Rose. Whilst examining the plant, we were pleased to observe an abundance of *Zygaena filipendulae* cocoons, and, despite the earliness of the date, a few imagines were in flight. With them flew one or two *Z. purpuralis* which previously we had taken only on the Isles of Rhum and Eigg. This discovery forges another link in the chain connecting the fauna of the Coll-Tiree group with that of Rhum and Eigg.

On primroses on the same cliff were feeding more larvae of *Colostygia didymata*, and, in pursuing our searches for these, a few representatives of *Euphyia bilineata* and of *Dysstroma immanata* were obtained.

Retracing our steps to the little marsh to which reference has already been made, we recognized a familiar gall in the shape of *Perrisia pustulans* on *Spiraea ulmaria*. This, in turn, revealed some rather familiar twists on the tops of the Meadow Sweet. These, when opened, displayed, as we had hoped, larvae of *Taeniocampa gracilis*, a species already known to be common at *Salix aurita* catkins on Coll in early spring.

We now threaded our way through a gorge in the moorland, finding as we did so a female specimen of *Bombyx rubi* with more *P. purpuralis* and *P. fuscalis* (and, incidentally, nests of the Eider duck!). We emerged on a curious swamp penned between rocks. Soon a huge shout advertised the discovery of something unusual, and I was compelled to hurry on to see what it was. From a distance I was informed that a brown butterfly was flying in myriads. A feeling of disappointment struck me, for I imagined I was being diverted from my own plans to inspect the common *Coenonympha pamphilus*. However, the extent of my amazement may be guessed when, as I approached nearer, I observed clouds of small Fritillaries on the wing. These, as in my Tiree experience, I still regarded as *Brenthis selene* until half a dozen pairs, massed together, were literally poured from our precious compass-case; these proved to be nothing less than *Euphydryas aurinia*, appertaining to the Irish form *praeclara*. To say they were abundant is to put it mildly, for they absolutely swarmed, battling here with *Vanessa cardui*, there with *Polyommatus icarus*, and, at intervals, investigating the sweets of the flowers of *Pedicularis palustris*. Clearly, they were (June 6th) just out, for numerous pairs adorned

the rushes. Additional males and females, boxed and brought home, mated and oviposited in captivity. From the resulting eggs, nests of larvae, which I inspect hopefully from time to time, decorate (?) the *Scabiosa succisa* plants in my greenhouse.

After I had enjoyed a further examination of this colony, I tramped toward the sand dunes, but, in doing so, discovered no novelties except a lovely group of the Oyster Plant (*Mertensia maritima*) on the beach and near by a female *Phragmatobia fuliginosa*. Finally, the dunes were reached and carefully explored, but at first sight they seemed devoid of life except for a few "Blues," *Epirhoe sociata* and the beetles *Quedius ochripennis*, *Carabus clathratus* and *C. catenulatus*. However, small though Gunna is, it struck me that I ought to sweep the *Lotus* for *Nyssia zonaria*. My quest was immediately successful.

The position of the sun now warned us that we had soon to return to the boat. This after a gruelling scramble was duly reached, and speedily, under a still cloudless sky, we were sailing past Eilean Ghreasamuil to land in the end at Miodar. There we began our steady tramp homeward, making little detours here and there in search of plants and insects. Of the former several important species were collected, but of the latter only *Bombus ruderarius*, fairly rare on Tiree, appeared as a novelty. However, as we rested on the Tràigh Mhor, not far from Ruaig, we found, crawling over the Yarrow and Trefoils, further quantities of larvae of *Nyssia zonaria*. These represented the first colony any of us has ever detected on the eastward side of the very many Hebridean islands investigated by us which support the species.

After this nothing was allowed to tempt us from our path, and we reached Scarmish tired—but satisfied!

PAPILIO BROOKIANA SEX RATIO.—Dr. L. R. Wheeler, discussing the sex ratio of *Papilio brookiana* Wall. (*Entom.*, **73** : 273), says that he believes females of the race *trogon* Voll. in Johore outnumber the males by 4 to 1. After many visits to its haunts, I concluded that the sexes were in about equal proportions, though at first more females than males were taken. There was very little difficulty in distinguishing on the wing between the sexes, which flew together throughout the day. Both sexes were most in evidence between 4 and 6 p.m., when they fed together on the flowers of a Mussaenda shrub. What appeared to me most notable was that no male was ever seen sucking up moisture from the ground—a habit usual with the subspecies *albescens* Rothsch. The insect was commonest in swamp jungle, but was also seen in the hills of S. Johore up to a height of about 1000 ft. Mr. H. M. Pendlebury published a note on the occurrence of *P. b. trogon* in Johore in the *J.F.M.S. Mus.*, **18** : 380–381.—JN. ELIOT, Capt. R.A.; H.Q. 4 Corps, Home Forces.

ON REARING LEPIDOPTERA.

By Frank Littlewood.

(Continued from p. 94.)

When the larvae are bigger the spoon is useful; one can sweep them into it with the brush, and drop them into the cage. Or, when still bigger, and clinging tightly, the bit of stem or leaf they are resting on may be snipped off with the pointed scissors, or pulled off with the forceps, and allowed to fall into the cage. Or, later on, in the open cages, when longer sprays are being used in water, the whole of the old spray with its attached larvae may be put into the new cage alongside the fresh food, and being cut off from its water supply will quickly wither and force the larvae to leave it, so that by the following day it may be removed.

Some larvae, particularly among the Bombyces, will roll into a ring when touched, and are then easily gathered into the spoon. Geometers will often fall by a thread when touched with the brush, and may be gently lowered into the cage. Under no circumstances should a larva be forcibly pulled off its resting place with the fingers; to do this is to court injury, which may perhaps not be apparent at the time. Neither must a larva be disturbed during its moulting rest. Indeed the less larvae are interfered with in every way the better will they fare. Whenever possible it pays to allow them to transfer themselves from the old food to the new; but this they will not always do, or rather, if they do condescend to move, it is at their own time, and one cannot always wait.

Much labour may be avoided if the amount of food is at first kept down to the minimum necessary for the day's consumption. "Little and often" is a good motto. Food should never be left in the cage to decay and become mouldy, and frass should not be allowed to accumulate. Indeed the most scrupulous attention is essential at this early stage, for the seeds of disease may then be sown which will later on yield a bitter harvest.

The food for young larvae should never be given them damp with dew, rain, or frost, for newly hatched larvae are very easily drowned. Moreover, the food should always be clean, that is, free from fungoid growths, greenfly and honeydew, and, if in the vicinity of a town, from soot and chemical deposits. If it is impossible to gather it clean, it must be sponged and dried before being put into the cage. Low plants, such as dandelion, dock, etc., should be washed free from rain-splashed soil, which often coats the undersurface of the leaves.

Tree-feeders often seem to do better if fed throughout on leaves

from the same individual tree, or at least from trees growing in the same locality. The character of the soil no doubt influences the composition and flavour of the foliage, and the indiscriminate gathering of food from widely different localities may occasionally affect the well-being of captive larvae.

Foliage that is damaged or stunted by the spring frosts has been found to be most injurious to larvae, and the paler second-crop leaves that appear about midsummer on some trees should on no account be used as food; fresh and tempting though they may appear they are certain death to any larvae eating them.

Larger Larvae.

The sojourn of the young larvae in the tumbler-cage is as a rule not of long duration, and is determined mainly by their kind and size. Generally speaking, so soon as the larvae attain a size that will prevent their escape through the small holes of fine-mesh perforated zinc, which material forms the base and the cover of the glass-cylinder cage, they are promoted to that more roomy and more airy cage.

The larvae of a medium-sized Noctua or Geometer, for example, remain in the tumbler for perhaps a fortnight; while those of a large Bombyx or Sphingid stay therein only about a week. Small larvae, such as those of Pugs or Waves, may safely be reared to full growth in the tumbler-cage; and odd specimens, or very limited numbers, of any kind of larva may be reared more easily in the tumbler than in a larger cage.

Glass-cylinder cages may be purchased from some of the dealers, but are rather expensive and unnecessarily clumsy. If the light glass cylinder formerly used as part of an old-fashioned candlestick is still obtainable from the ironmonger, it is not a difficult matter for the young collector to make this type of cage for himself, especially if he is anything of an amateur craftsman and can handle a soldering-iron. The only other materials required are some tin canister lids of appropriate size, a 1 lb. stone jam jar, and some special fine-mesh perforated zinc.

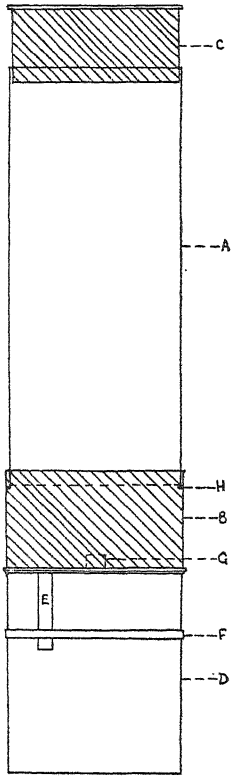
In these days, when almost every schoolboy dabbles in "wireless," a simple soldering outfit and the necessary knowledge of the art may be there to draw upon. If not, recourse may be had to the local tinsmith, if that rare species is not already extinct.

Some hints on the construction of this home-made cage may be useful.

The special small-mesh perforated zinc used for the base and cover bands is not usually stocked by the ironmonger, but may be ordered through him of the makers, or possibly obtained direct from a dealer in entomological apparatus. The ordinary-sized

mesh, as used for a household meat-safe, is obtainable everywhere, and is quite good enough for many kinds of larvae, but is not suitable for the small fry.

The zinc base-band is fitted to the *outside* of the glass cylinder, while the cover-band is fitted to the *inside*. The base-band is 2 in. deep, the cover-band 1½ in. The length of both is half-an-inch



GLASS CYLINDER CAGE.

A.—Glass cylinder.
B.—Perforated zinc base band.
C.—Perforated zinc cover band.
D.—1 lb. stone jam jar.
E.—2½ in. tin strip (or stout wire).
F.—Rubber band.
G.—Centre tube.
H.—"Stops" to support cylinder.

longer than the circumference of the glass cylinder, which allows enough overlap for joining up the ends. These zinc bands are carefully cut out of the original flat sheet with ordinary scissors (but *not* your wife's best pair), and are made to assume the necessary circular form by rolling them tightly round a small round canister. The base-band is then adjusted to the cylinder—tied on, in fact, temporarily, with string—with two-thirds of it projecting over the end of the cylinder. This projecting part is then fixed with a spot of solder on the inside of the joint. The band is then taken off and the other end of the joint soldered. To be perfect, the fit of the base-band should be what a workman calls an "easy"

fit, for too tight a grip may result in a cracked glass when the glass expands in hot weather. It is a safe precaution to warm the cylinder before fitting this band. There is not the same risk with the cover-band, as it slips inside the cylinder and does not grip it if the glass should expand.

In fitting the cover-band, one edge is pressed tightly to the *inside* of the opposite end of the glass cylinder, and the projecting overlap gripped with the pliers. So held, the band is withdrawn and solder applied to the inside of the joint.

Some sort of a " stop " is required to support the cylinder at the proper height in the base-band. A very simple but quite effective stop may be made with a common pin soldered, head upwards, to the inside of the band. The head of the pin is about half-an-inch below the upper edge of the band; and three of these pins, at equidistant points, are needed to hold the cylinder level. No stop should be required for the cover-band, which may safely be a closer fit, but if it is inclined to slip a thin rubber band stretched around it will act as a stop.

Both zinc bands have now to be attached to their respective canister lids, which are the lever-lids of empty golden syrup tins. They might have been made for the job. That for the base is used wrong side up. A touch of solder at four points makes them secure, but before the base lid is joined up to its band it must have a $\frac{5}{8}$ in. hole punched in the centre and a tube of tin, $\frac{1}{2}$ in. deep, let into the hole. Here I did call in the help of the tinsmith, as it is not too easy to make a neat hole of this diameter without a proper tool. But if a tinsmith is not within reach one need not be dismayed; for it is possible to make a hole, of sorts, with the curved point of a jack-knife, lightly tapped with the hammer, taking a little bit at a time, all round the circle marked out. The lid should rest on a piece of sheet lead during this operation. The edges of the hole will be rather jagged, but may be smoothed down with a round file, and the tube soldered in, using plenty of solder. Solder—like putty and paint—can be made to cover a multitude of sins. Three narrow strips of tin, about $2\frac{1}{2}$ in. long, are soldered to the underside of the base lid, and are bent over to grip the sides of a 1-lb. stone jam jar, which forms the foundation of the cage and acts as the water-vessel. Birdcage wire, if available, may take the place of the tin strips, and makes a neater job. A strong rubber band around these legs reduces the tendency of the cage to wobble when moved about.

The glass cylinder is one that is (or perhaps I should now say, used to be) sold with a candlestick, of foreign manufacture, stocked by the ironmonger. Its dimensions are, height 7 in., width $3\frac{1}{4}$ in. It is light in weight and the glass is clear and free from distortion.

The only disadvantage is that the cylinders are not all of exactly the same diameter, so that they are not readily interchangeable. In practice, however, this does not much matter, as with ordinary care there should be very few breakages.

A final hint: Use only dilute hydrochloric acid (spirits of salt) as a flux when soldering *zinc*. I had this invaluable tip from a friendly plumber, and never was help so sorely needed or so thankfully received.

This pattern of cage I have used extensively for many years as a feeding-cage, intermediate between the tumbler and the various patterns of larger final cages to be mentioned later. And although when first designed it was intended to house only the smaller geometers, its advantages were such that I found myself using it for other kinds as well. It appears to suit any species of larva that will thrive in a cage that is light and airy, and with food on the immersion principle. The changing of the food, and of the water, is accomplished with such ease, and the condition of the food and larvae is so readily observable, as to make it one of the most useful as well as one of the prettiest types of breeding-cage.

An external water-vessel is a noteworthy feature of all my cages. In the one now under consideration a 1 lb. size stone jam jar acts as the water-vessel, and, in addition to forming the foundation of the cage proper, one substantial and solid enough to allow of the cage being lifted bodily by it and carried about in one hand, has by reason of its more ample capacity and its independent outside position some very considerable advantages over the more commonly advocated small bottle placed inside the cage.

The disadvantages of an inside bottle as a receptacle for water may be said to vary inversely as its size: the smaller the bottle the bigger the risk of trouble unless proper precautions are taken. And since the bottle selected is invariably a small one, on account of its taking up less room in the cage, and as no allowance has been made for its limited capacity, it is not surprising to find many larva-rearers condemning the immersion method as productive of diarrhoea and kindred ailments, and resorting to the opposite " close " method of feeding, namely, fresh cut food in air-tight tins.

Both methods have their adherents, and either will, in capable hands, produce satisfactory results. After a good many years of larva-rearing I cannot say that I am strongly biased in either direction and, indeed, regularly employ both methods. Certainly some kinds of larvae appear to do better with " dry " feeding, and thrive in a closed tin, and some night feeding species will grow more rapidly and to a bigger size if the tin is dark as well as closed. On the other hand, it would appear that there are kinds that appreciate the lighter and more airy cages used in the immersion method,

whilst others again will not thrive at all unless provided with a frequent sun-bath, for which open wood and gauze cages are essential. To sum up, some larvae are hardy and indifferent and will prosper under almost any reasonable conditions; others are delicate or fastidious, and will die off in spite of all one's thought and care. Either method of feeding is good if its limitations are understood, and it is not fair to blame the method if failure with it has been due to slipshod management, or, as often happens, to some obscure and inherent weakness in the brood itself. The latter is, I am convinced, a far more frequent cause of failure in rearing from the egg than is commonly admitted. The style of feeding—dry or immersion—is therefore only one of the many factors contributing to success or failure, and we have yet much to learn as to the requirements of larvae in captivity or even in nature. Such problems lend fascination to our work.

But, for the moment, we are concerned only with what is known as the "immersion" method; that is, the food kept fresh in an open cage by having its stems placed in water. And the point at issue is, What advantages are gained by the employment of an outside water-vessel, of ample capacity, rather than an inside bottle of the customary insignificant proportions?

In the first place, then, the outside jar holds a large volume of water in proportion to the mass of food-stem immersed. Consequently there is no risk of the water level being lowered by absorption by the food to an extent that will leave the stems high and dry. Such an eventuality, however, may easily occur when the small bottle is used. Even more important is the fact that the larger volume of water is much less liable to become fouled by the putrefaction of the submerged vegetable matter. In a small bottle this contamination of the water by the food-stems is a very real danger, and has proved to be a fruitful cause of diarrhoea in larvae.

The capacious straight-sided jar is easily cleansed, and any scum or deposit removed with a cloth or mop; a bottle, on the other hand, if of the usual shape, is much less easy to clean out thoroughly, and a mere rinse is not enough.

Lastly, the jar being outside the cage and get-at-able, it is possible to change the water at any time—every day if considered necessary—without in any way disturbing the cage or its contents, or disarranging the food-plant, which itself may not be due for changing. A piece of charcoal should be kept in the water-jar. It certainly helps to keep the water sweet, though frequent changing is still strongly advised. Tutt claims that charcoal tends to keep the food-plant fresh also, and if this is really so it is an advantage with a food that is difficult to obtain and so not readily renewable.

(To be continued.)

SOME NOTES ON *HYLOICUS PINASTRI* (LINN.).

By Darell M. Jeffreys, B.A., and Neville L. Birkett, B.A.

We have read with interest the recent notes on this species (*Entom.*, **73**: 138 and 196), and feel that a few notes on our experience with this insect may not be without interest.

In 1939 we were staying in the New Forest, and decided to spend at least one day in the Dorset area to look for *pinastri*. On June 29 we travelled to the Wareham district early in the morning and started searching the trunks of the pines which occur in small scattered woods. D. M. J. was the first to find a specimen. It was a freshly emerged female of the grey form and was at rest right at the foot of the tree. The ground in this area is very marshy, and it is probable that after heavy rain the pupa would be completely submerged in water. The specimen was marred by having a cystic right hind wing, which was fortunately " doctored " successfully before setting. Two more specimens, both females, were found on the same day. Both these were of the red-brown form and were found 4–5 ft. above the ground on the leeward side of the trees. One of these females, when in the cyanide bottle, laid about 40 immature ova, which dried up several days after being deposited.

On July 2 we again travelled to the same area and again spent the morning searching for *pinastri*. N. L. B. was fortunate enough to find a pair *in cop.*, and it was decided to keep the female to obtain ova. This pair was found at about 11 a.m. and was about 6 ft. above the ground on the western aspect of the tree—there being no wind at the time. The pair remained *in cop.* until about 12.30 p.m. The female, when found, was rather worn, but the male was in perfect condition.

All these specimens were found where the trees were scattered, and an extensive search made where the trees were close-set did not produce a single specimen. Also the specimens were found up to 6 ft. from the ground and not above that, although we looked high as well as low.

The female of the pair laid about 150 ova between July 2 and 7. She was placed in a medium sized cage along with a small branch of the food-plant and was fed periodically on a mixture of sugar and water. We saw her at work at 3 a.m. on the 3rd. She would lay about six eggs in as many minutes and would then rest for about ten minutes to recover from the effort, and then repeated the process. At the time of her death she was extremely battered with her egg-laying efforts. It is interesting to note that although the

food-plant was present in the cage, most of the eggs were deposited on the zinc of the cage or in the peat on the floor. This latter fact made it very difficult to collect the eggs.

With the advent of such a number of ova we had intended to study the early stages of the moth in some detail. Circumstances unfortunately did not permit of this, but the following notes may be of interest :

The ova were distributed as follows : Mrs. Jeffreys and D. M. J. had 81, D. W. Blyth had 15 and N. L. B. took 55. These latter were removed as carefully as possible from the sides of the cage, because at the end of our holiday N. L. B. was going one way and the cage another. These 55 did not hatch, although changes took place to quite a late date. The markings on the eggs do not appear until nine or ten days after being laid. They were kept in a tin with a sprig of food-plant. Whether the trauma sustained on their removal from the cage or the fact that the tin in which they were kept was too dry was the cause of death, we do not know.

By August 15 Mrs. J. and D. M. J. had had 80 larvae hatch about 13 days after the eggs were deposited. Among the larvae there were a number of deaths, chiefly during the first and second instars. It was observed that the larval horn in the first instar was bifid and that there was some slight persistence of this in the second instar also. D. W. B. reported that of the 15 ova 13 had hatched, one was infertile and the other failed to hatch, although changes occurred.

By September 20 all the surviving larvae had burrowed. Mrs. J. and D. M. J. had 39, which duly went down. These larvae when full grown varied in colour from almost all green to almost all brown. D. W. B : Six larvae burrowed, four of full size and two small ones. During November D. M. J. sent N. L. B. ten pupae and at the same time found one dead one in his cage.

Emergence of the imagines took place during 1940 and mainly in June of that year. It is worth noting that at the time of writing we each have one pupa still alive, and are wondering if *pinastri* sometimes spends two years in the pupal state. If it does so we shall report on the matter at some future date.

The first specimen to emerge did so on May 15 (N. L. B.) and was a female. Owing to the severity of the winter the pupae had been kept indoors in a room which faced due north and in which the temperature often fell below freezing. This date of emergence is a very early one, but because of the unnatural conditions is of little value to record. Of the 10 pupae (N. L. B.) 8 emerged between May 15 and June 26, one was found dead and one pupa is still alive. Of this series of eight, five were females and three males. An unsuccessful attempt was made to get a pairing, and although the

female was often " calling," the male in the cage with her took no notice at all.

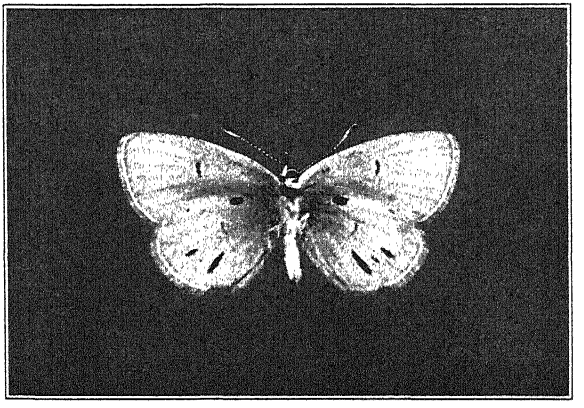
D. M. J. and Mrs. J. : 14 emerged," mostly females." Of these one was of the red-brown form the same as the parents, the rest being slaty grey in colour. D. M. J. found 16 pupae in one cage killed by a fungus infection. D. W. B. reports that six of his pupae emerged—no dates are given.

Thus from about 150 ova we obtained 28 perfect insects and have each one pupa still alive.

There is an interesting point which arises from the results obtained in these efforts. Mr. Granville White mentions that there is a tendency for the Dorset specimens to have darker and browner markings than those from Suffolk. We have not seen any Suffolk specimens, but feel that the slaty-grey coloured specimens we bred must approach this form—brown being almost entirely absent from the wings and body. The parents of our series were of the red-brown type, whereas only one of the offspring—a female—was of this type. Also one of the females we found in Dorset was of this grey type. It is our hope that some day we may obtain ova of the Suffolk type and obtain a series of moths for comparison.

Ulverston;
December 22, 1940.

CUPIDO MINIMUS AB. STRIATA.—The figure below shows the underside of a specimen of *Cupido minimus*, with striate marks on the hind wings, taken at Horsley, Surrey (20.vi.08). The aberration appears



to be one of extreme rarity and this particular specimen has not hitherto been figured. The photograph is by Mr. W. H. T. Tams.—E. S. A. BAYNES; Monkshatch Cottage, Compton, Guildford.

SOME GALL-CAUSING SAWFLIES IN SURREY.

By M. Niblett.

The following notes are compiled from my observations of the galls and attempts to breed out their occupants. I have not given so much attention to these as to those of the *Cynipidae*, but have observed or collected the galls intermittently for a number of years.

Pontania proxima Lep.—The galls of this species I have found as a rule to occur plentifully in every locality where its host-plants, *Salix fragilis* L. and *S. alba* L. grow. It is double-brooded; from galls collected from August to October *proxima* emerged in the following April, May and June, while from June galls the insect emerged in August and September. On *S. fragilis* I have found the galls at Oxshott, Hackbridge, Mitcham Common, Beddington, Carshalton, Epsom Common, Wimbledon Common, Kingswood, Bookham Common, Colley Corner, Effingham Common, Walton Heath, Barnthorne Wood, Headley and Dorking; and on *S. alba* at Effingham Common, Carshalton, Westcott, Norbury Park and Walton Heath. The percentage of emergences of *proxima* I have had from galls kept has been small, as has also that of parasites; the Coleopteron *Balanobius salcivorus* Pk. I had from one series of galls. The earliest date I have found the gall of this species is June 4.

P. bridgmanni Cam.—Galls of this species I have found on *Salix atrocinerea* Brot. at Epsom Common, Limpsfield Chart, Bookham Common, Epsom Downs, Barnthorne Wood, Oxshott Heath, Ockham Common, Walton Heath, Wisley Common, Arbrook Common and Coldharbour; on *S. caprea* L. at Wimbledon Common, Leatherhead, Mitcham Common, Effingham, Banstead Downs, Kingswood, Riddlesdown, Limpsfield Chart, Epsom Common, Colley Corner, Banstead Wood, Walton Heath, Bookham Common, Boxhill and Lady Margery Wood; on *S. aurita* L. at Epsom Common and Limpsfield Chart. The earliest date on which I have found this gall is June 9. I am doubtful as to this species being double-brooded; from galls collected on July 9 from *S. atrocinerea* the larvae commenced leaving the galls on July 12, pupated, and the sawflies emerged in early August; from another series of galls on the same host-plant collected July 16 the larvae commenced leaving the galls on July 21, but no sawflies emerged until the following April and May. From a series of galls from *S. caprea* collected July 9 the larvae began leaving the galls on the following day, the last making their exit on the 26th; one *bridgmanni* emerged

on August 4 and the remainder from May 2 to 21 of following year. From another series collected on September 3 all the larvae had left the galls by the end of that month ; seven *bridgmanni* emerged on October 16, three in November and one in the following May.

I have not yet succeeded in breeding out *bridgmanni* from the few galls I have found on *S. aurita*. The earliest date I have had this insect emerge from galls of the previous year is March 24. Ichneumons emerged in August, November, April and May, and *Balanobius salcivorus* in April and May. I was interested to observe a larva of this species repairing its damaged cocoon.

With this species the percentage of emergences was low ; from 54 galls 3 sawflies emerged ; from 37 one only ; from 75, 4 ; and from 212, 11 ; in each case only a small number of parasites emerged, so it would seem that the rate of mortality of the larvae must be pretty high. I found that if the larvae were placed on earth when they left the galls they immediately proceeded to burrow into it to spin their cocoons, but if no earth was provided the cocoons were spun on the leaves near the galls from which they had emerged.

P. viminalis L.—I have found the galls of this species on leaves of *Salix purpurea* L. in one locality only, i.e. Epsom Common, where I first found them in 1927 and where they still persist in fair numbers ; they were rather scarce in 1930, but in other years have been fairly plentiful. The species is double-brooded ; from galls collected on June 16 *viminalis* emerged on August 1 ; from other series collected in July, August and September the sawfly emerged in May and June of the following year. I bred one ichneumon in May and several Chalcids in June of second year, the larvae of both pupating in the galls. The earliest emergence of *viminalis* I have had was May 17 and the latest June 18 from galls of the previous year. The earliest date I have observed the gall is June 6.

From a series of galls collected on August 9 larvae emerged and pupated in the earth ; I kept the remaining galls, thinking that probably some parasites might emerge from them, but to my surprise seven *viminalis* emerged, the majority coming out on the same dates, May 22 to June 2, as those whose larvae had pupated in the earth. The cocoons were spun amongst the frass in the galls. This is the only occasion on which I have had sawfly larvae pupate in their galls.

P. pedunculi Htg.—The gall of this species is confined as far as my observations go to pure colonies of *Salix aurita*. I have found it at Limpsfield Chart, Wimbledon Common and Epsom Common. In these and in other localities I have observed *aurita* hybrids, but have failed to find any of these galls upon them. I believe it to be a single-brooded species ; the earliest date I have found the gall

is June 2. From galls collected in July and August *pedunculi* emerged from April 15 to May 5 of the following year. I have not found them as a rule in any numbers, but in 1927 and again in 1937 they were plentiful on Epsom Common. I have searched for the gall in other localities where *aurita* occurs, but have only found it in those previously mentioned. The percentage of emergences of this sawfly have been low.

Euura venustra Zad.—The galls of this species I have found in the petiole of leaves of *Salix caprea* at Arbrook Common, Banstead Downs and Ranmore Common; and in those of *S. atrocinerea* at Bookham Common. Upon only one occasion did they occur in any numbers, although probably longer periods of searching might have disclosed more at other times. August and September were the months in which the galls were found, the insects bred emerging in mid-May of the following year.

All material from which these sawflies were bred was kept in an unheated wooden shed, the temperature of which was rarely more than a few degrees different from that prevailing outside.

Mr. R. B. Benson at various times very kindly examined the sawflies and my thanks are due to him for the determinations.

Several small colonies of *S. viminalis* and fairly extensive ones of *S. repens* have repeatedly been examined but no sawfly galls have been discovered on them.

10, Greenway,
Wallington, Surrey.

ERYNNIS TAGES AND PYRGUS MALVAE PLENTIFUL IN HUNTS.—It may interest readers that I found *tages* and *malvae* in large numbers in Diddington Wood, Huntingdon, in May of last year. In June, in the same wood, I observed that every one of the many *Agapetes galathea* which I found flying low among the tufts of dry grass in a large clearing had, on the undersides of the wings, quite deep ochre markings, as well as a similarly coloured background on the upper surfaces of the wings.—WALLACE PETERS; 19, Kenneth Crescent, Willesden Green, London, N.W. 2.

PURPLISH VARIETIES AMONG THE VANESSIDAE.—In a letter in the *Entomologist* (**72** : 100) Mr. Watkins refers to colour varieties of a "smoky purple, giving a greasy and somewhat transparent appearance, presumably caused by thinness of scaling." I have in my possession five or six specimens of *N. io* of this shade, and in each the scales are tightly rolled up all over the affected area. With somewhat less tightly rolled scales, an intermediate brownish shade is produced. It would appear likely that such effects are the result of local conditions at the time of emergence from the pupa—possibly the humidity of the atmosphere.—J. F. D. FRAZER; 1, Stanley Gardens, W. 11.

A MASS EMERGENCE OF THE DRAGONFLY *COENAGRION PUELLA*.

By Bertram Lloyd, F.L.S.

On May 22, 1938, a day of hot clear sunshine, my wife and I at 4 p.m. and thereafter watched a number of individuals of *Coenagrion puella* emerging from their nymph-cases at a little pond in Shenley village (Hertfordshire). During the hour and a half while we were watching there, many, splitting their outer husk, successfully extricated themselves, and after relatively short periods of rest, fluttered off on their first flight. We saw in all more than a hundred such dragonfly nymphs ready to split their skins, clasping the stems of plants in the pond growing above the water-level, including a small iris and grasses; and there were doubtless very many more in this state of which I could take no note. During this period of watching I saw only a single mature male *Coenagrion puella* near the pond, the many others flitting about being immature; so that an emergence in mass was evidently taking place on this the first suitably sunny day for more than a week past.

One tall grass-stem bore four, and many others three clinging nymphs. None of these plants rose more than 5 in., and most only 3 or 4 in. above the surface of the pool. I watched several nymphs emerge from the water, crawl slowly up plant-stems for 2 or 3 in., then clasp them firmly and remain quiescent, preparing to undergo the final stage of their metamorphosis. There were sometimes two or three thus on a single slender stem; and in such cases the uppermost, having been the first to leave the water, was the first to split. In one case I watched the whole process at a distance of about 5 yards. Sitting on the bank I was able, with the aid of a field-glass, to view closely the splitting skin and the gradual emergence of the soft, greyish dragonfly with its stunted, crumpled wings, which however rapidly expanded and dried in characteristic fashion, literally growing beneath one's eyes. After this insect had with much effort slowly writhed itself free from the nymphal skin which it had worn, it rested for a short while, moving then gradually, as did others similarly watched, higher up the stem, and ultimately remaining poised at the tip, swaying in the breeze for some moments. Presently, quite suddenly, the dragonfly spread its wings (by now virtually full-grown) and floated up in the air, drifting across the meadow surrounding the pond. At this stage of its existence, the insect appeared very hyaline on the wing, the body not showing any blue, the wings gleaming like silver. I watched this process almost exactly repeated by three or four other stem-clasping nymphs. All the newly emerged dragonflies, I

noticed, flew at first directly landwards—over the surrounding meadow and away from the water whence they had emerged. This may, however, have been due to the direction of the gentle breeze which prevailed.

In one individual, which fluttered straight from the top of a grass-blade over the water on to my wife's hand as she sat by the pond-side and remained resting there for about ten minutes, it was possible to observe at very close quarters the increase in size of the abdomen and the changing colour of the body.

While watching the manner in which the emergent dragonfly heaved itself out of the cracked nymph-case, and, just after emergence, remained resting for a period, slightly throbbing, still partly attached to the old case, I noted with interest that in several instances (all that I saw, in fact) the imago certainly did not buckle backwards and remain hanging head downwards for a while, as has been often observed and described as customary in some other Odonata.* On the contrary, each of these newly-emerged *Coenagrion puella* remained erect for 15 minutes or more while still attached to the nymph-case before climbing yet higher up the stem.

W. J. Lucas, in his *British Dragonflies* (1900), in describing a typical dragonfly emergence takes *Libellula quadrimaculata* as his example. In that species, as with some *Aeschnidae* and perhaps with most of our *Anisoptera*, when the imago is nearly out of the nymph-case, "the body usually falls backwards as if the insect was exhausted. . . . In this position of rest (head downwards) it remains for some time. . . ." But he notes that in the case of *Pyrrhosoma nymphula*, in several emergences watched (in captivity), the insects did not fall back at all, "but kept the fore-part of their bodies erect during the resting-period"; while an *Agrion* (= *Coenagrion*) *puella*, caught in the act of emerging, "was at the same time also resting with its body erect." He adds: "Whether this is so with all *Zygopterids* remains to be proved."

The main interest of my few observations recorded above is that they were made, not with insects bred in confinement, but actually in the field, and that they apply to a number of individuals.

DOES VANESSA ATALANTA HIBERNATE HERE?—It may be of interest to record that Mr. E. W. Lifton states that he saw a specimen of the above sunning itself on a wall near Painswick Church on the Cotswolds at about 12 noon (B.S.T.) on March 15, 1941, a warm sunny day. This appears to be his only early record. He has never previously seen the species until the end of May.—C. GRANVILLE CLUTTERBUCK; 23, Heathville Road, Gloucester, March 22, 1941.

* See, e.g., Réaumur's classic description (presumably applying to *Aeshna cyanea*) in the *Histoire des insectes* (1734–42).

A NEW SPECIES OF *ECHINOPLA* (HYM. *FORMICIDAE*), WITH SOME NOTES ON THE GENUS.

By Horace Donisthorpe, F.Z.S., F.R.E.S., etc.

Echinopla crenulata sp. n.

♀. Black, rather dull; anterior part of masticatory border of mandibles except teeth, apex of last joint of antennae, extreme apex of scape and first joint of funiculus, extreme apex of femora and tibiae, last two joints of anterior and posterior tarsi, apex of other joints, spurs, and claws, reddish yellow; palpi yellow. Head, thorax and petiole sparingly covered with a fine grey pubescence, whole body with long outstanding not very close yellow hairs. Sculpture of head, thorax and petiole consisting of deep punctures or pits of irregular shape and size (not so marked on petiole), the spaces between being raised smooth and somewhat shining, the punctuation of the gaster being smaller, closer, and more regular. *Head* transverse above, narrowed in front, cheeks and temples rounded, posterior border narrowly margined, with sharp posterior angles, sinuate on each side in front of neck, slightly and roundly produced between the sinuations; *mandibles* longitudinally striate, smooth at base, broad at masticatory border, which is armed with five not very sharp teeth, the two at base being small; *clypeus* transverse, rather flat, anterior border slightly sinuate in middle and somewhat sharp and raised; *frontal area* indistinct; a distinct longitudinal narrow carina between the *frontal carinae*; *eyes* very globose and prominent, but not large. *Antennae*: *scape* shining, punctured, not extending beyond posterior border of head; *funiculus* pubescent, 1st joint longer than 2nd, joints 2–11 gradually increasing in length and breadth; last joint pointed, equal in length to the two preceding taken together. *Thorax* not very convex above, subquadrate, no sutures on dorsal surface, contracted on each side where the meso-epinotal suture would be; sides crenulate, the crenulation being strongest at the sides of the anterior and posterior borders and extending a little way along both on each side; *pronotum* with a distinct narrow transverse neck which is smooth and shining, anterior angles ending in a sharp tooth formed by the crenulations; *epinotum* rounded at posterior angles and at base; there is no angle between the dorsal surface and the declivity, the former being gradually rounded into the latter. *Scale of petiole* narrow, transverse, truncate in front, armed at sides with six teeth as follows: one small tooth just before anterior angles and slightly raised; a second, a little longer, situated at anterior angles, followed by a third longer than the other two; after an interval comes the longest tooth, followed by a shorter one and a still shorter one after that; *gaster* long oval, the very long first segment with a narrow raised shining margin at base. Long, 6 mm.

Type in B.M. (N.H.).

Described from a single worker taken by Miss L. E. Cheesman in Dutch New Guinea, Waigeu Island, Camp Nok, 2500 ft., April, 1938.

Smith founded the genus *Echinopla* (1857, *Journ. Proc. Linn. Soc. Lond. Zool.*, 2 : 79) for the reception of his species *E. melanarctos* from Singapore.

The distribution of the species of this genus extends from the Nicobar Islands and Malasia to New Guinea and Queensland.

The characters of the genus are as follows :

☿. *Body* massive, with more or less parallel sides. *Head* short, truncate posteriorly ; *eyes* placed before the middle of the sides, globose in some species. *Clypeus* very short, anterior border not projecting ; *frontal area* distinct or wanting. *Frontal carinae* short and very wide apart. *Mandibles* with a short masticatory border, toothed ; *maxillary palpi* 5-jointed ; *labial palpi* 4-jointed. *Thorax* broad, high ; *shoulders* rounded or dentate ; upper surface obtusely margined or rounded ; *sutures* on dorsal surface sometimes wanting ; usually the *meso-epinotal suture* is very distinct and often impressed. Sometimes the *pro-mesonotal suture* is present and terminates in a notch on the lateral borders of the upper surface. *Epinotum* arched, unarmed, and without a declivity. *Petiole* short, armed at each side with a long spine, or two or three short ones. *Basal segment* covering at least two-thirds of the gaster.

♀. Head and petiole as in the ☿, except that *ocelli* are present.

♂. Unknown.

There are 19 described species, 1 subspecies, and 3 varieties of *Echinopla* including this new species ; only five females are known and no males. It is very curious, but in all the literature I have searched I have been unable to find any reference concerning the habits or life-history of these very distinct looking ants. They are all of moderate size, none being very small. It is evident that no nests have been found and all the captures just casual ones.

Entomological Department,
British Museum (Nat. Hist.) ;
December 20, 1940.

NOTES AND OBSERVATIONS.

THE HABITS AND FOOD-PLANT OF APAMEA UNANIMIS TR.—In the last number of the *Entomologist* (**74** : 21–22), Dr. de Worms gives a few notes concerning the present species not in complete harmony with my observations, which extend over a period of many years, and cover a stretch of country lying between Co. Durham and Strathpeffer, Ross-shire. He speaks of finding larvae of the species in great profusion feeding on the *short* stems of *Phragmites*. In spite of the fact that I have obtained, and can still obtain at the proper season, thousands of larvae of this species, never at any time, or at any place, have I seen it on *Phragmites* ; in my experience it is com-

pletely attached to *Phalaris arundinacea*. Furthermore, I feel sure that Dr. de Worms is dealing with the same grass when he mentions the "short stems" of *Phragmites*; this species is our tallest grass! Moreover, I know a favoured habitat of *Apamea unanimis* in which both *Phragmites* and *Phalaris* grow together, but only the latter is eaten. In addition, an attempt to supply the larvae with any other grass than *Phalaris* or its garden variety, the Striped Ribbon Grass, always ends in failure. The larvae are just as easy to obtain by day as by night, as they spin the *Phalaris* leaves into cylindrical tubes in which to hide during the daytime; they leave these hiding places as soon as it begins to get dark. Cylinders with tenants are easily detected by touch. The best way to deal with the larvae is to get them as late in October as possible and to place them in a 10-in. plant-pot over coconut fibre. Fresh *Phalaris* should be supplied until no traces of its being consumed are visible. When that happens, the larvae have become full grown and have buried themselves to assume the pupal state in March and April. Even the much attacked Greene, as quoted by Tutt in his *Practical Hints for the Field Lepidopterist* (Pt. III, page 53), indicated that he recognized that *A. unanimis* did not feed in spring.—Prof. J. A. Heslop Harrison; King's College, University of Durham.

Habits of Second Brood Plusia gamma.—Every year in this locality there is a fairly large emergence of a second brood of *Plusia gamma*. It seems to begin in mid-September, and in 1940 lasted all through October, the last insect being seen on November 4. Whereas the early broods fly at dusk and by night, the autumn moths seem to fly only by day, and the brighter and hotter the day, the better. They like to alight suddenly on a leaf in the hottest and most sunny spot and there they stay for several minutes. But on the other hand they can stand quite severe frosts. One October I found one resting in the morning on a leaf where it had obviously been overnight, with a temperature of five degrees of frost. Towards the end of October, 1940, I was pruning an apple tree after the leaves had fallen, and was about to cut off a twig apparently affected by canker when I discovered that the "canker" was a *P. gamma*, resting longitudinally on the twig! There had been a sharp frost during the night.—B. Tulloch (Brig.-Gen.); Hill Court, Abergavenny, February 21, 1941.

Some Observations on "The Liberation of Butterflies" and "County Records."—In the March number of this magazine (*Entom.*, **74**: 65), Lt.-Col. Neville Eliot attempts to make a case for the introduction not merely of indigenous butterflies into new areas, but also of "foreigners." Whilst I do not oppose the introduction of rare or local species into districts where they once abounded, or where they have better chance of survival, I feel that I must say a word about the introduction of species which in all probability have never occurred here naturally.

Col. Eliot seems to make a point of the fact that the artificial

establishment of a colony may provide data of interest. Let us examine this suggestion. Many interesting phenomena may occur when an insect is introduced to a new neighbourhood. These phenomena fall into two categories which are by no means sharply defined, i.e. (1) the effect of the insects on the fauna and flora of the locality, and (2) the effect of the environment on the insect. These two categories are still further complicated by the simultaneous introduction of inhibitors (parasites, predators, etc.) with the insects (the effect of the inhibitors already existent in the locality and their effect on the insect introduced being of course covered by (2)), and *their* effects on the existent fauna and flora.

The question regarding the introduction of inhibitors with an insect is an exceedingly complex one. If it is desired to make a study of the effects of introducing a species, is one to breed a pure strain in order to eliminate parasites? For if the effect of the introduction of a species is studied and that species has not been "bred" in the manner described, how are we to know whether some of the phenomena observed are due directly to the insect introduced, or to its parasites?

If an insect is introduced as a pure strain there occur certain reactions in that neighbourhood, but be it marked, reactions which have only the slightest relationship to the ecology of the insect in the area from which it has been taken. Apart from the elimination of its normal inhibitors on the insect itself there will almost certainly be factors in the new locality to which the insect has not been subject in the old, and conversely, factors may be missing to which the insect has been accustomed.

If, on the other hand, the insect is introduced with some of its normal inhibitors, there is a possibility that the natural scale may be tipped overwhelmingly against this or that species. Especially is this likely to affect "rare" species existing in the locality. For among many factors accounting for "rarity," high on the list must be placed the probability of a delicate natural balance.

If it is decided that the introduction of natural inhibitors with an insect is not justifiable on the above grounds (and I do not think that it is justifiable), then the only data one could expect to obtain would relate to the behaviour of that one species in that one locality, and that under unnatural circumstances. The whole subject is so delicate and so little likely to lead to useful results that I feel that it is a sheer waste of time to consider the introduction of "foreigners." There is quite enough useful work to be done on the preservation of our own rare and local insects without wasting energy on extraneous matters.

Another point which arises through Col. Eliot's article, though not directly concerned with it, is the question of "county boundaries." In his answer to the hypothetical arguments of "the confirmed Listophil," he lays stress on the harrying of rarities and its consequent bearing on natural spread; but it occurs to me that the main fallacy in the Listophil argument is ignored. This is the fact that county boundaries are artificial and can have no real bearing

on questions of distribution. If, for instance, an insect has been known for some years to exist in a certain type of terrain in one county and is suddenly discovered to exist in similar terrain in another county some 20, 50, or 100 miles away, then that fact may be interesting, but only in as far as previous geographical boundaries of the species and the physiography of the intervening terrain are concerned.

The term " county " is after all only a matter of convenience and of no entomological significance. However, it is useful in some ways, and may well stand until a more scientific method is devised and generally used. The practice, however, of watching and waiting for a species to " spread naturally " over a hypothetical line, pouncing on it, and claiming it as a new county record, seems to me childish in the extreme and far removed from scientific observation.—E. W. CLASSEY, Pte. R.A.M.C.

[Pte. Classey does much to show where the scientific interest lies in the introduction of a species to a new environment.—ED.]

LIBERATION OF BUTTERFLIES.—I think that it was during the seasons of 1907 and 1908 that the late Mr. E. Goodwin, of Canon Court, Wateringbury, Kent, liberated a considerable number of *Limenitis camilla* in the woods around his house. He was having larvae sent from the New Forest in the hope of breeding some varieties, and wished to give the ordinary specimens which hatched out the chance of establishing themselves in the Wateringbury Woods, where there was plenty of honeysuckle. The result was just *nil*. They did not take on and no larvae were ever discovered. Rather more than a quarter of a century rolled by, and a *camilla* appeared on its own. During the season of 1934 Mr. Goodwin told me that he had seen at least 200 specimens on the wing over the very grounds where he had previously released them. The devastating frost of the following mid-May thinned out the stock and they have never been so plentiful since. They are, however, quite established now in the woods around. On July 13 last I counted five flying together in the Mereworth Woods about two miles from Mr. Goodwin's house.—E. B. PUREFOY ; East Farleigh, Maidstone.

LIBERATION OF BUTTERFLIES.—I shall be obliged if you can find space for a few short comments on Lt.-Col. Neville Eliot's paper on " Liberation of Butterflies."

Though the introduction of a foreign species is not so objectionable as the planting-out of our native species, it none the less gives a false idea of our fauna, which is very imperfectly guarded against by recording the fact that it has been introduced. In many cases it may spread to this country by natural means, and then the objection is even greater than when it cannot be supposed to have done so. Even in the case of *Araschnia levana* it is undesirable—and as a matter of fact it has been erroneously reputed to be British (see W. F. Kirby's *European Butterflies and Moths*, 1882, p. 14).

The Dutch race of *Lycaena dispar* was never indigenous to Britain, but if it had been introduced before the British variety was known to

be extinct it would have caused endless confusion. The study of *local* variation is, of course, greatly hampered by introductions.

Surely if the "small Andean Argynnids" were on their way to New Zealand, their arrival in that Island would be obscured if the species had been already introduced artificially. It would be impossible to work out the *natural* migration. I have no sort of belief in "surveillance" by some pontifical body of entomologists, and in any case cannot see how it could control the species when introduced. As to the doubt whether the liberation of Commas and White Admirals has, or has not, had "any appreciable effect on the recent spread of these insects," surely the doubt is enough to invalidate the data—the records are uncertain and certainty of data is necessary for scientific inductions. I see little objection to the liberation of specimens in localities from which their parents were taken. I do it myself, though I take pains to return such captives to the exact locality from which they originated. I think that if it were realized how much trouble "liberating" gives to those who are trying to provide accurate data as to distribution, few would for slight reasons carry on the practice.—C. I. Paton; Ormley, 7, Cavendish Road, Sutton, Surrey, March 8, 1941.

Liberation of Butterflies.—Might I be allowed one final (?) word in the discussion on liberating butterflies that some of your readers may remember I instigated quite three years ago. In this first note on the subject I merely stated that I had started a campaign by a talk on the B.B.C. and various articles in magazines, to try and interest the ordinary nature lover in the idea of increasing our butterfly population. I offered to supply the need from the surplus stock we so often breed on our "Butterfly Farm" at Bexley. I brought down a storm of abuse on my head from certain quarters, as this sort of thing "upset all records," etc.—an individual point of view I considered rather selfish when the idea was only meant to give harmless pleasure to a wide section of the public, who so far had probably not enjoyed the intimate association with butterflies which had so obviously been the share of the writers of these letters. I never suggested introducing foreign insects at all, but this was immediately implied. Now your contributor Lt.-Col. Neville Eliot sums up the whole discussion admirably, and I would ask everyone who has contributed to the series to read their own notes again—and then turn to his article in the March issue and read that again! What a battle royal of words it has been. I hope there is no ill feeling on either side. Surely it is the privilege of everyone living in this democratic country of ours to voice his own opinion without minding criticism. It might be a pleasant "peace aim" for all entomologists to see what they can do after the war is over to help establish again butterflies in those districts where they have been unavoidably exterminated because of the army occupying their favourite breeding-grounds. I know of several localities where this has happened already, and I hope I shall live to do "my bit" at any rate.—L. Hugh Newman: "The Butterfly Farm," Bexley, Kent.

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NOTES ON LEPIDOPTERA AT THE LIZARD IN 1940.

BY C. GRANVILLE CLUTTERBUCK, F.R.E.S.

WE had arranged to spend a fortnight at the Lizard from June 25 to July 9, and therefore, notwithstanding our friends' suggestions that we might be bombed, we left Gloucester by train at 12 noon on June 25 and reached our destination at 9.10 p.m., less than an hour late.

The next morning we walked down Church Cove to the sea and found that as the result of the severe frosts of the previous January the magnificent show of geraniums formerly growing in profusion over the cottages winter and summer had disappeared, the plants having been killed. Our first capture was a fine large female *Sphinx ligustri* at rest on a wooden post. Amongst other species noticed were several fresh *Aglaias urticae*, *Maniola tithonus*, *M. jurtina*, *Epirrhoë galiata*, *Homoeosoma sinuella*, *Crambus cerusellus*, *C. culmellus* and *Gracilaria tringipennella*.

On the 27th I found a female *Hepialus humuli* at rest on a New Zealand Cabbage Tree (*Dracaena*) in the garden of the farm-house where we stayed, and on the Downs *Plebejus argus* and *Eumenis semele* were fairly common whilst single specimens of *Ochlodes venata*, *Mesographe forficalis*, *Alucita tridactyla* (*tetradactyla*), *Cnephasia longana* (*ictericana*), *Phthorimaea plantaginella*, and *Monopis ferruginella* were netted. *Acronycta rumicis* larva was found on the flowers of dock. The imago emerged on August 6.

On the 28th we motored to Falmouth and on the return journey we explored a small wood on the roadside at Gweek, where we took *Schrankia costaestrigalis* and *Argyroploce lacunana*.

On the 29th on a cliff I boxed a specimen of *Aegeria muscaeformis* on flowers of thrift; other species taken were *Ortholitha chenopodiata*, *Marasmarcha phaeodactyla* and *Cnephasia conspersana*. On the 30th we saw a *Colias croceus* flying up Caerthillian Valley from the sea, probably driven out of France by the Germans! *Argynnis aglaia* was flying on the cliffs together with *Argynnis selene*, which was rather worn, and *Leucania impura* was taken flying in the sunshine.

My wife found seven *Cerura vinula* and one *Amphipyra pyramidea* larvae feeding on the poplar trees in the same garden on July 1. At 8.30 a.m. I boxed a fresh *Vanessa atalanta* feeding on veronica blossoms. At Predannack on the 2nd I netted another fresh *V.*

atalanta, *A. aglaja*, *Zygaena trifolii* (including two var. *confluens* taken by my wife), *Ortholitha mucronata* and *Eucosma cana*. Mr. Godfrey A. Foljambe very kindly gave me a straw-coloured var. of *Coenonympha pamphilus* taken by him on the Lizard Down on June 15. On the 3rd we saw *Vanessa cardui*, probably an immigrant. We took *Thymelicus sylvestris*, more *Z. trifolii*, *Leucania conigera* and *Euphyia bilineata*. On the 4th near Kynance Cove we took a female *A. aglaja*, *P. argus*, *Pseudoterpna cytisaria*, *Lyncometra ocellata*, *E. galiata*, *Phytometra viridaria*, *Pyralis glaucinalis*, and *Tortrix viburniana*. On the 5th at Housel Bay *E. galiata*, *Xanthorhoë spadicearia* and *Argyroploce variegana* were captured.

On the 6th at the Lizard fresh *V. atalanta*, *A. aglaja*, *A. urticae*, *Lycaena phlaeas*, *Z. filipendulae* and *Eilema lurideola* were observed. Mr. Wood, Assistant Lighthouse Keeper, showed me specimens of *Pheosia gnoma* (*dictaeoides*) and *V. atalanta*, the latter taken last November. This, combined with the fact that we were taking fresh specimens on July 1, more than a month earlier than ever before, appears to show that at the Lizard this species may be able to over-winter in this, our most southerly locality. On the 7th at the Lizard Mrs. Clutterbuck beat *Plutella annulatella* out of a furze bush. According to Meyrick (p. 803) the larva feeds on Scurvy grass (*Cochlearia officinalis*). This is believed to be a new record for Cornwall. At Predannack in the evening we saw the Royal Fern (*Osmunda regalis*) growing wild. On the 8th near the Lizard Lighthouse *Hadena serena* was boxed off a wooden gatepost, *Nomophila noctuella* was netted and *Aphomia sociella* taken at rest on a wall.

On the 9th we returned home, having spent a very enjoyable holiday only marred by one rainy morning. At Gloucester I found a female *S. ligustri* had emerged from a Lizard pupa probably two days earlier, judging from the ragged edges of its wings.

I am indebted to Mr. H. M. Edelsten for identifying my specimens of *Z. trifolii*, and to Mr. G. A. Stringer for the identification of *P. annulatella*.

Mr. Foljambe wrote as follows under date 30.ix.40: "Perhaps a report on the back end butterflies here since you left may be of interest. On the Downs *E. semele*, *M. tithonus* and *Pararge megera* swarmed with a fair amount of *C. croceus* and a few var. *helice* among them. Three examples of *C. hyale* in good order on the slopes near Polpeer last week. *Aphantopus hyperantus*, a good form, was plentiful along the Kennack stream with an *A. paphia* or two and innumerable *Polyommatus icarus* and *O. venata*, *V. cardui* and *L. phlaeas* in plenty, though I have come across no varieties of the latter. A large colony of the dark brown hairy larvae of *Macrothylacia rubi* on the path and in grasses below the lighthouse.

I also found four smallish larvae on sea thrift near Lloyd's Signal Station, about 1½ in., hair in tufts, ground-colour chocolate with four white longitudinal bars or diced spots. They are now spinning up and I will try to send you the pupae presently. The plague of *Pieris brassicae* larvae has been locust-like, and turnips, cabbages and the like have been stripped. No steps have been taken to control them by spraying or otherwise. Water shortage is becoming acute as week after week passes in bright sunshine and cold N.E. breezes."

23, Heathville Road,
Gloucester;
1 December 14, 1940.

WICKEN FEN FUND.—Owing to a recent illness I am unable to undertake the collection of subscriptions for this fund for the present. Mr. H. M. Edelsten has kindly consented to receive them for the remainder of the year and to transmit them to the National Trust. Will subscribers kindly send their contributions to him at Bramble Hill, Balcombe, Sussex.—W. G. SHELDON May 14, ; 1941.

HYLOICUS PINASTRI (LINN.).—In regard to this moth (*Entom.*, **74**: 108) the fact that some of the insects may not emerge during the following year is now likely to be well known. During 1931 we took a number of *pinastri* off solitary pines in Dorset. From 45 ova retained, 3 larvae died in the first 24 hours, but the other 42 emerged as perfect insects, 35 in 1932 and 7 in 1933.—Dr. R. C. LOWTHER, F.R.E.S.; Fernleigh, Grange-over-Sands, Lancashire.

FIRST APPEARANCES, 1941.—Having regard to the late spring this year, the following dates of first appearances as noted by me at Sevenoaks, Kent, and by Mr. H. E. Pounds at Dorking, Surrey, may be of interest.

Sevenoaks: *Gonepteryx rhamni*, March 14; *Polygonia c-album*, March 14; *Aglais urticae*, March 21; *Pieris rapae*, May 4.

Dorking: *Gonepteryx rhamni*, March 11; *Polygonia c-album*, March 13; *Nymphalis io*, March 14.

So far this year I have noted six examples of *P. c-album* at Sevenoaks, whilst Mr. Pounds has recorded three at Dorking and three at Selsdon, Surrey.—WILLIAM E. BUSBRIDGE; "Gresham," Bradbourne Park Road, Sevenoaks.

CUPIDO MINIMUS AB. STRIATA.—With reference to the figure of this insect in last month's issue of the *Entomologist* (**74**: 109), I should like to record that I took a magnificent example of this extreme rarity on the South Downs in Sussex on August. 8, 1936 (second brood). My specimen has nine heavy striations on each hind wing and three large black spots on each fore wing, similar to the costal spots in Mr. Baynes's specimen. I believe my specimen so extreme as to be unique.—A. E. STAFFORD; 83, Colborne Way, Worcester Park.

ON REARING LEPIDOPTERA.

By Frank Littlewood.

(Continued from p. 106.)

Sprigs of food-plant of a length that the cage will easily accommodate have their cut ends passed through the basal tube and immersed in the water below. The upper end of the tube is then tightly plugged with cotton-wool, pressed home with the forceps, to prevent inquisitive larvae wandering down to a watery death. It is a great mistake to crowd the cage with food-plant. An uninterrupted draught of air through the cage not only permits the moisture transpired by the foliage to evaporate naturally without condensing on the side of the cylinder, but also facilitates the escape of noxious exhalations from the frass. The latter quickly dries up, so that the growth of mould is not encouraged.

Larvae do not appear to need much air for actual breathing, but it is important that what they have should be pure and sweet. Moreover a stagnant atmosphere seems to predispose larvae to "sweating," the certain forerunner of disease.

Many kinds of food-plant will keep fresh for a considerable time in this type of cage, especially in the early summer months when the shoots are rich in sap. But this apparent freshness is apt to prove deceptive. It does not follow that because the leaves have not actually wilted they are suitable food for larvae. The ideal food is obviously that in growing condition, fresh with its natural sap. Shoots immersed in water may for a long time simulate the freshness of the growing plant, but may in reality be badly waterlogged and utterly unfit for feeding. Succulent plants, when kept in water for more than a day or two, are a fruitful source of diarrhoea in larvae. It is wisdom therefore to limit the amount of food in the cage to no more than a two days' supply, the water being replenished and the jar thoroughly cleansed each time the food is changed.

The process of changing food and larvae is simplicity itself. The cage is stood on a large sheet of paper on the table, and the cylinder with its cover is lifted off. The metal base is next removed from the jar and the old food-stems pushed upwards through the central metal tube, and carefully laid down with their cargo of larvae on the paper. The frass is shaken or brushed out of the base, and any odd pieces that may have stuck to the glass cylinder are removed. A stiff paint brush, of the sashtool pattern, is useful for brushing out the frass.

Fresh stems of food-plant are then plugged in the tube with cotton-wool, and the metal base put back on the jar. The metal cover is now taken off the glass cylinder and the latter replaced in

its proper position on the base, the food-plant being threaded through the cylinder and nicely disposed therein. If the tops of the food-stems project above the rim of the cylinder they may be bent over and pushed down or else cut off altogether. Tender growing tips are really better cut off, as the too succulent food, though greedily eaten by larvae, is, as a rule, not good for them, and may in some cases lead to diarrhoea, especially after the larvae have left the nursery stage.

It now only remains to transfer the larvae from the old food to the new. If there is room in the cage, and the old stems have been fairly denuded of leaves, the upper portions of the stems, with the larvae attached, are cut off and dropped bodily into the cage, and the larvae will transfer themselves.

If the larva is of a kind that readily releases its hold and drops (e. g. many of the Geometrae), the old stem is held above the cage and the larvae disturbed with a camel-hair brush. Some kinds of larvae (e. g. Dicranurids and Noctuids) cling tenaciously to their support, and it is not wise to attempt forcibly to remove them. In such cases the leaf or portion of stem they are holding is neatly snipped off with the pointed scissors and allowed to drop into the cage. By the following day most of the larvae will have forsaken the withered food, which is then lifted out.

Care is taken, when replacing the metal cover, that larvae attached to the inside rim are not nipped and injured. It is highly important that these glass and metal cages be kept out of the direct rays of the sun. Sun-loving larvae, as already stated, are housed in airy wooden cages covered with muslin or gauze.

Larvae of the larger kinds are, after a period in this glass cylinder cage, transferred to a larger cage constructed on the same lines, but having the cylinder made of perforated zinc and the base an earthenware seed-pan. Such a cage, though less convenient as an observation cage, is practical, and allows proper provision for the pupation of burying larvae. Those that spin up without burying are transferred to a larger cage of box pattern, glass-fronted and zinc-backed, a useful design and a good observation cage. An external water-vessel is still employed, but now takes the form of a bulb bowl or similar wide jar. The wood cage has half-inch holes bored through the bottom, through which the food-plant stems are threaded, while the seed-pan has a short zinc tube set in with cement.

Some species of larvae are conservative in their tastes and feed only on one kind of plant. Others are more catholic and will eat almost anything green. But even among polyphagous larvae, there is, with each species, usually one kind of food they prefer; and if a variety of food is offered at first they will quickly and with one

accord make their own selection. But they may at a later stage refuse the food of their earlier choice and demand a change. Some kinds of larvae can change suddenly, and even more than once, from one food to another, and will starve or resort to cannibalism if not humoured; other species appear to be more delicately constituted, and though they may eat a new food readily enough will suffer by doing so. And others are so extremely fastidious that even the same kind of food but culled from a different tree may be injurious. Once I lost the whole of a healthy brood of *zonaria*, which had been contentedly feeding on sallow, merely by giving them an odd meal of sallow of a different variety. On the other hand, a brood of *elinguaria*, which had for some reason begun to decline, recovered rapidly when changed from hawthorn to sallow.

As a general rule, so long as a food is agreeing, and the larvae are attacking it with relish, there is no object or gain in making a change. And even if they should begin to show signs of distaste, by refusing to eat, or by that restless wandering about that is often the forerunner of cannibalism, there is unfortunately no time for tentative trials as to whether a new food will agree; an immediate change is imperative, and the only thing one can do is to offer an assortment of likely foods and hope for the best.

I have already referred to the necessity of offering very young larvae young and tender foliage. One cannot expect their tiny jaws to deal with the harder and tougher cuticle of the mature leaf. Moreover, many of the spring species, e. g. the Taeniocampas, habitually burrow into the unopened buds, or spin little webs around the terminal buds, and thus protected feed exclusively upon the unexpanded leaves and stems.

But, as the larvae increase in size and are able to masticate the maturer foliage, it is my practice to nip off the tender growing tips of all food-sprays put into the cage. This precaution is intended as a preventive of diarrhoea, which is asserted to be the result of a too succulent diet. But although on the face of it this is a reasonable supposition, I have not found even this precaution effectually to check the scourge. It is true, nevertheless, that many kinds of larvae, the Sphingids particularly, appear to fare better when restricted to food of mature growth; so probably as a general rule it is a safe one. On the other hand, I have found that the larvae of *miniosa* and *croceago*, to name only two, will thrive only if fed throughout on the young juicy foliage; the older leaves are not at all relished, and if compelled to eat them these larvae die a lingering death from constipation. Diarrhoea is a devastating ailment, but so is constipation. As an instance of the latter, let me quote a sad experience I once had with *A. menyanthidis*: I had reared a very fine brood from the egg and all had gone well until

they were practically full grown. In a natural state they spin their cocoons among the ling on the moors. I put a bunch of old dead, or nearly dead, ling in the upper part of the cage, but instead of spinning up in it right away as I intended they should the misguided creatures began to nibble it. Immediately they became constipated, were unable to void any frass, refused to eat or were unable to eat any more of their rightful food—hawthorn, lingered on idly for many days till in the end every one died. It was a great disappointment, the kind every breeder gets occasionally, but it was also a lesson.

Again, the larvae of *T. leucographa*—a notoriously difficult thing to rear—rapidly resort to cannibalism if denied the juicy food they crave. And it appears to be the natural juices of the plant that they require. I have not found that external moisture such as may be given by the use of the spray ever satisfies them or stays their murderous propensity. In this connection a note by Dr. Chapman (*Ent. Record*, 1892, p. 153) is suggestive. He refers to the habit of many Noctuid larvae leaving the tree on which they started life and resorting to low plants. This change in their mode of life takes place when they are about half grown. It is conceivable that the low plants may supply the extra succulence their system demands, and if provided at the proper time may check or entirely stave off the cannibalistic habit. I have yet to prove it, but have a strong conviction that such a drastic change of food at that time of life might make all the difference between success and failure with these difficult larvae.

Polia chi, to take another example, is reputed to be a difficult larva to rear from the egg, and such indeed has been my own experience time and again. It invariably begins to sicken and die off when about half grown, and this no matter what kind of treatment it has received up till then. It is not a question of overcrowding. Half-a-dozen larvae in a roomy cage will die just as readily as a big crowded brood. Maddison (*Ent. Rec.*, 1892, p. 3) describes the same sort of thing with this species even when sleeved out on a growing tree of hawthorn in the garden, so that the cause of the trouble may be innate. I fully believe, though so far I have not been able to test it, that here again is a case where a change to a more succulent food, e. g. some garden plant, such as Delphinium, Lychnis, etc., or even some weed such as Dock, Groundsel, Chickweed, etc., might work wonders and get the brood through to maturity. Funnily enough, whenever I find an odd wild larva of *P. chi* on some plant in the garden, I rear it through without the slightest difficulty, which seems to support my contention.

Larvae that are naturally of a solitary habit may, if crowded together in a breeding cage, drift into cannibalism, especially if

deprived for even a short time of food, or compelled to eat a food that is not really to their taste. This observation, which I believe I am right in crediting to Dr. Chapman, has been borne out by my own experience.

Corbin (*Entom.*, 1872. p. 190) states his belief that larvae if removed from their birthplace are difficult to rear. This idea is supported by the ill-success I myself have had in rearing larvae from Kentish ova here in Westmorland. Too big a proportion die in the earliest stage before settling down properly to the food I am able to give them. It may be that there is some subtle chemical difference in the foliage of even the same kind of tree or plant when grown in a widely separated locality, or again it may be merely a climatic difference.

Notodont larvae, particularly, should be fed as soon as possible on well matured leaves. Too succulent food quickly brings on diarrhoea. The same applies to Sphingids.

Larvae of *A. rumicis* failed, with me, on succulent dock, but did quite well on the drier diet of wild strawberry and ash. This behaviour seems curious in view of the fact that this larva is frequently found wild on dock and on the even more succulent leaves of garden rhubarb, apparently thriving on them.

It is possible that Acronyctid larvae, e. g. *rumicis*, *psi*, *menyanthidis*, etc., require a certain amount of sunbathing to keep them in perfect health, for all of them lead an exposed life and make no effort to conceal themselves. *Arctia caia*, too, basks freely after feeding, and may miss this natural tonic in confinement. A wooden cage covered with muslin makes a suitable and safe sun cage, but the food quickly wilts by the exposure and must be renewed frequently. Unfortunately we cannot so easily order the sun, and a dull period may easily thwart one's efforts in this direction. At the moment of writing, July 13, the weather has, after a lengthy hot spell, suddenly deteriorated into wet and cold, with a drop in temperature of about thirty degrees and a complete absence of sunshine. A brood of *menyanthidis*, which up till now has done well, is hanging fire when almost full fed. I believe larvae, like ourselves, are depressed by cold. In such unseasonable periods it might pay to keep the cage in a warm room, a kitchen or a heated bathroom. There is room for further research in this direction.

Some species of larvae are well known to be of delicate constitution and difficult to rear, e. g. *P. cassinea*, *P. plumigera*, etc. (Barrett).

D. vinula, also, is most uncertain. I have occasionally reared it without any difficulty. At other times, and more often, the larvae under precisely the same treatment have died off like flies. And the same thing has happened even when the larvae have been

sleeved out on the tree, in a roomy sleeve and with favourable weather conditions. In such cases one is bound to conclude that the trouble is innate and not due to mismanagement on the part of the collector.

O. antiqua and *A. leporina* are frequently attacked by a fungoid growth when lying up for a moult. This affection is not caused by overcrowding; it may happen to an odd larva just as easily as to a brood.

Barrett says of *D. fascelina*: "Extremely difficult to rear in confinement unless placed upon a growing plant and allowed plenty of air and sunshine." Of *E. lanestris* he says (and I myself can confirm it): "If kept in confinement, and not allowed plenty of air and sunshine, they become at this stage, namely, the final instar, excessively restless and refuse to spin up, continuing to feed a little and wandering about, sometimes until far into the autumn, after which most of them die." This refusal of food and wandering habit I have found to afflict *G. papilionaria* and other species. It is very annoying when a brood has been brought with considerable work and care practically to full growth. The larva-rearer has to steel himself against such disappointments and try again.

These few examples will, however, suffice to show how different species of larvae may have widely different tastes and habits, and many a good brood will be lost before the rearer discovers the correct treatment of a particularly fastidious kind. Fortunately for us there are many species that are easy to rear, so easy in fact as to make the job merely routine, though pleasurable enough at that. Sickly larvae make poor patients, indeed they are as a rule all hopeless cases. Timely preventive measures, in the nature of ample room, fresh air, cleanliness, clean food of the proper kind, and genial temperature, are infinitely better policy than belated attempts at a cure. The most important factors of all are, I am convinced, the right kind of food and a regular suitable temperature. Experience alone will determine which food is best, and artificial means will sometimes help to counterbalance unfavourable weather conditions and unseasonable temperatures.

The habits of the larva in a state of nature will sometimes suggest the appropriate treatment in confinement, and these habits it is the business of the entomologist to discover, both by reading up the published experiences of others, and, better still, by his own observation in the field and by his own mother-wit.

A point of considerable importance is, I think, the separation of the forward larvae from those that are lagging. In every brood, even from eggs that have hatched simultaneously, it will be found that a certain proportion of the larvae are stronger and more enterprising than the rest, and rapidly outstrip their fellows. These

vigorous individuals probably arise from the earliest laid ova ; those from a spent female, if they hatch at all, frequently produce weakly larvae, destined for an early grave. In many cases the cause of this early lack of vigour and of an unhatched remnant of eggs is incomplete fertilization. Recent observations have made it clear that many species require to copulate more than once in order to ensure complete fertilization. Another factor tending to a general weakness is continued inbreeding. In my own experience a first inbred generation may be strong, equal in every way to their parents and sometimes even better ; but further inbreeding results in deterioration in size and in fertility. On the whole, wild stock is desirable, and especially a female that is not far worn. Pairing in nature takes place almost immediately, and it is not essential that a female should be worn to be fertile. A fresh or almost fresh parent is more likely to yield a strong batch of eggs. If many eggs are laid, select those laid first and throw the rest away.

Rippon (*Entom.*, 1915) makes some useful remarks on what he terms the " pre-hatching influence " on the strength of larvae. His ideas are, I believe, perfectly sound ; indeed his whole paper on larva-rearing should be read and re-read, for it teems with valuable observations and practical advice. It is quite the best contribution to the subject I have ever seen. He stresses the fact that hereditary weakness is a factor of importance, which cannot be circumvented by any perfection of method in the rearing. My own experience with sleeved larvae—kept under practically natural conditions—has shown that even they by no means invariably prosper ; so that there may be causes of larval mortality more subtle than any mere errors of treatment, causes in fact beyond the breeder's control.

One form of early weakness I have noticed is an apparently faulty alimentary canal and an anal organ that is unable to function. Such cases are of course hopeless.

Diseases of a contagious type appear to originate among the laggard larvae and only later on spread to the better end. This is an argument for the early separating of the brood. If, at the end of the first week, or at latest, fortnight, the bigger and more promising larvae are separated from the backward portion, and are given generous treatment in the matter of food and attention, they should stand a better chance of escaping infection and should go ahead in proper style.

Actually, this vigorous contingent is the only portion of the brood that is worth the rearing, unless we are dealing with a very rare species where *every* specimen is of value ; and we should be saved endless trouble and annoyance if only we could bring ourselves to weed out and ruthlessly discard the weaklings at an early stage.

(To be continued.)

CALLICERA RUFA SCHUMMEL (DIPTERA: SYRPHIDAE): COLOUR-VARIATION OF ABDOMINAL HAIRS IN THE ADULT, WITH A NOTE ON LONGEVITY OF THE LARVA.

By R. L. Coe,

Department of Entomology, British Museum (Natural History).

In a previous paper dealing with *Callicera rufa* Schummel (=*yerburyi* Verrall), I mentioned that Schummel described the adult female as having the abdominal hairs entirely rufous, whereas in ten examples of that sex bred or captured by myself the fourth segment is extensively black-haired. Two examples of the female in the British Museum, taken by Colonel Yerbury at Nethy Bridge, Inverness-shire, agree with mine in having the fourth abdominal segment predominantly black-haired, and this discrepancy from Schummel's description of the female *rufa* probably led Mr. Verrall to regard the specimens as representing a new species. Herr Sack, in Lindner's *Die Fliegen*, also mentions that *rufa* is entirely without black hairs on the tip of the abdomen, but it cannot be ascertained whether he actually saw specimens of *rufa*, or took his details from Schummel's original description or from other authors.

The point has now been elucidated by the emergence in September, 1939, of a female *rufa* with entirely rufous-haired abdomen from a batch of immature larvae collected by myself in July, 1938. It is apparent that the colour of the hairs on the fourth abdominal segment in the female may range from entirely rufous to practically all black, the same being true in the case of the male. The single example of the latter sex examined by Schummel had the fourth abdominal segment mainly black-haired, whereas in one of my examples the black hairs were confined to the posterior area of disc, the side-margins being continuously rufous-haired. Schummel thus described the species from a male of the black-haired form and a female of the rufous-haired form, the predominant form in the latter sex in Scotland being, curiously enough, the dark-haired one.

In my 1939 paper on the species I remarked that "Twelve immature larvae were collected in July, 1938, and at the present time (end of July, 1939) it seems improbable that these will complete their metamorphoses this autumn. Their third year, at least, in the larval stage is therefore commencing. . . ." At the time of writing this present note (February, 1941) only one of these larvae has attained the adult stage, the remainder having nearly reached their fifth year, at least, of existence.

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Sack, P. (1928).—*Die Fliegen*, IV (4) : No. 31 (Syrphidae) : 112.

Schummel, L. (1841).—"Verzeichniss und Beschreibung der vom Verfasser bis jetzt in Schlesien gefangenen Zweiflugler der Syrphenfamilie," *Ubers. Arb. Verand. schles. Ges. vaterl. Kult.* : 112.

The International Rules of Zoological Nomenclature.—As one who has devoted a long lifetime to the investigation of the entomology of New Zealand, and published six books on the subject, I am unable to agree with Mr. B. C. S. Warren's remarks on the great scientific value of the control of nomenclature exercised by the International Commission on Zoological Nomenclature (*Entom.*, **73** : 229). So far as actual scientific work is concerned, however, I heartily agree that it should be clearly understood that the accurate record of the eternal facts of nature, such as life histories, habits, structure, distribution and other similar matters, where definite verification is possible by direct reference to nature, is essential, and any failure in accuracy in recording such facts should be ruthlessly exposed and corrected. But it should be equally recognized that the mere naming of species and genera is on a totally different footing, the whole concern of nomenclature being purely a human convention for the convenience of naturalists. It has been urged over and over again that the perpetual changing of names, which have been long in use and are consequently well known to all workers, is a very serious hindrance to the study of natural history in general. Mr. Meyrick's rule that the general use of a name for 50 years should establish permanent validity is an excellent one, and its adoption would have saved many of the vexatious alterations which have been perpetrated during the last 25 years and are so proudly referred to by Mr. Warren. It is utterly discouraging and disheartening to any author who has written, and perhaps also illustrated, a complete book on a portion of a certain fauna to have his work immediately spoilt and made hopelessly "out of date" by the alteration of a number of the names,* merely to uphold the infallibility of the Law of Priority and the International Rules. Such doings in fact forcibly remind one of the grossest superstitions of the Dark Ages. The law of priority is right enough if tempered with common sense, but the slavish adherence to legal formalities certainly cannot be called scientific in the sense that that term was used by such men as Charles Darwin and Herbert Spencer. I am well aware that the views here expressed are not orthodox at the present time, but I am equally sure that the great scientists above referred to would have been the last to advocate their suppression merely on that account.—G. V. Hudson; "Hillview," 80, Messines Road, Karori, W. 3, Wellington, New Zealand.

* See p. 141.

FURTHER REVISIONAL NOTES ON MALAYAN RHOPALOCERA.

By A. Steven Corbet,
British Museum (Natural History).

Papilionidae.

Papilio ramaceus pendleburyi nom. nov. is proposed as a new name for *Papilio ramaceus dealbatus* Pendlebury, 1939, which is preoccupied by *P. janaka dealbatus* Rothschild, 1895.

Satyridae.

Lethe europa malaya nom. nov., proposed for *Lethe europa* Distant (*nec* Fabricius), 1882, *Rhop. Malay.* : 43, pl. v, fig. 5 ♂, 6 ♀; Malay Peninsula. Fabricius described *Papilio europa* from a male from " America " in the collection of Lady Anne Monson, who lived in South India, and, in the absence of evidence to the contrary, it must be presumed that the specimen was obtained in South India. It is possible that a male in the Banks Collection in the British Museum, which agrees closely with South Indian specimens, is the Fabrician type. Fruhstorfer's restriction of the habitat of the nominotypical form to Macromalayana was probably based on nothing more concrete than Butler's statement (1870, *Cat. diurn. Lep. Fabr.* : 43) that the species was represented from Java in the British Museum.

The subspecies from Malaya and Sumatra is certainly darker than that from South India and requires a new name ; the forms from Borneo and Java may represent still further new races.

Nymphalidae.

Phalanta alcippe alcesta nom. nov., proposed for *Atella alcippe* Distant (*nec* Stoll), 1883, *Rhop. Malay.* : 174, fig. 46 ♂ ; Penang. It does not appear that Moore designated a type of his *Atella alcippoides* (1900, *Lep. Ind.*, **4** : 199, pl. 361, figs. 1, 1*a*, 1*b*, ♂♀ wet-season form ; Sikkim, Khasias and Perak), and his figure of the male agrees best with examples from South India, although he had no specimens from this locality. The figure cannot be reconciled with the lighter Malayan subspecies, and it seems that Evans (1924, *J. Bombay nat. Hist. Soc.*, **30** : 92), was correct in placing *alcippoides* as the race ranging from Sikkim to North Burma.

Parathyma urvasi (C. & R. Feld.). I have carefully examined the unique male type of this butterfly from the Malay Peninsula and am satisfied that it is an aberration of the common *Parathyma*

nefte subrata (Mre.). Fruhstorfer stated that the eyes were ciliated in *urvasi*, whereas in fact they are naked in both *urvasi* and in *P. nefte* races.

Lebadea martha koenigi subsp. nov. ♂♀. Intermediate between nominotypical *martha* (Fab.), from Peninsular Siam, and subspecies *malayana* Fruh., from the Malay Peninsula, as regards the intensity and extent of the orange-brown markings. The narrow dark submarginal line on the hind wing is inwardly shaded with bluish white (not shaded with white on both sides as in ♀ *malayana*), and in the ♂ the fore-wing apex is whitened as in ♂ *martha*. Fore wing ♂ = 28·5 mm., ♀ = 29 mm. Malay Peninsula, Kedah, Padang Terap, 3.viii.1930 (*A. S. Corbet*). Named after Dr. J. G. Koenig, who visited Malaya in 1778 and 1779, and whose diaries contain the earliest record of butterfly-collecting in Malaya.

Euthalia julii bougainvillei nom. nov., proposed for *Euthalia xiphiones* Distant (*nec* Butler), 1886, *Rhop. Malay.*: 439, pl. xxxvi, fig. 10 ♂, 9 ♀: Malay Peninsula. The female holotype of *Nymula julii* R. P. Lesson (1837, *in* Bougainville, *Journal de la Navigation autour du Globe de la Fregate* La Thétis *et de la Corvette* L'Espérance (*Paris*), **2**: 345, pl. xliv, fig. 4, 4 *bis* ♀; " Chili "), is clearly not of Malayan origin as Fruhstorfer assumed, but agrees closely with females from Tonkin and Annam, and must have been obtained at Tourane in the latter country, which was visited by *La Thétis* and *L'Espérance* in January, 1825. Fruhstorfer's name *indochinensis*, therefore, falls to *julii* (Lesson) and a new name is required for the Malayan subspecies which, in the female, is distinctly darker than *xiphiones* (Btlr.), described from Moulmain.

The other butterflies obtained during this voyage round the world in 1824–1826, of which M. le Baron de Bougainville was in charge, were :

Danais ceciliae Lesson, 1837, *tom. cit.*: 342, pl. xliv, fig. 1, 1 *bis* ♂; " L'Océanie." [=synonym of *Danaus affinis abigar* (Eschsch.), from Luzon.]

Danais anais Lesson, 1837, *tom. cit.*: 343, pl. xliv, fig. 2, 2 *bis* ♀; " L'Océanie." [=*Valeria valeria* (Cram.) subsp. from Annam, Tourane.] Lesson's name may be used for the Indo-Chinese race of *V. valeria* in place of *philomela* (Fab.), which is preoccupied by *Papilio philomela* Linn.

Danais edmondii Lesson, 1837, *tom. cit.*: 344, pl. xliv, fig. 3, 3 *bis* ♀: Philippines. [=*Danaus melanippus* (Cram.) subsp. from Luzon.]

Lesson's figures are good and the fixation of the type locality presents no difficulty as it is on record that the expedition visited Pondicherry, Penang, Singapore, Luzon, Macao, Tourane and Surabaya in the Indo-Malaysian region.

Euthalia dirtea dirteana nom. nov., proposed for *Symphaedra dirtea* Distant (*nec* Fabricius), 1883, *Rhop. Malay.*: 112, pl. xii. fig. 7 ♂, 8 ♀; Malay Peninsula. Fabricius based his name on a female specimen from "Bengalia" in the British Museum and figured in Jones's *Icones*, **4**, pl. lxv, fig. 1. The type specimen is no longer in existence, but Jones's figure shows the underside of the hind wing ochreous brown and not bluish green, so that the insect cannot have been obtained in the Malay Peninsula as Fruhstorfer supposed. There is, in fact, no reason for doubting the habitat given by Fabricius.

LYCAENIDAE.

Surendra todara Mre. Brigadier A. W. G. Wildey obtained a female of this species in Pahang, Fraser's Hill, in November, 1939. I have not seen the specimen, but Brigadier Wildey's careful description and drawing leave no doubt as to its identity.

PECULIAR TASTES OF BUTTERFLIES.—Several correspondents lately have been expressing surprise at the fact that certain butterflies should feed on the moisture from dung. Those entomologists who have ever collected in the Alps will recollect that many species of "Blues" simply crowd at droppings and moist places on mountain roads. But "Blues" are not the only butterflies with peculiar tastes. In Hong-Kong if I wanted *Charaxes polyxena* or *athamas* it was useless to look for them anywhere else except on certain trees where they sucked up the sap from damaged branches. In Kashmir damp sand at river sides was a sure place to find *Gonepteryx rhamni* and *Papilio machaon*. At Pontresina in Switzerland I found a damp patch caused by a rather evil-smelling bog at which a dozen species of *Lycaena* swarmed. Collecting in a very hot gully near that place *Argynnis thore* settled on the back of my hand and sucked up the sweat. At Plymouth *Vanessa atalanta* feeding on ivy blossom used to come down from the low cliffs at low tide and suck up the salt water from the sand, and when they had had enough they flew back to the ivy. I only hope that an observer standing on the cliffs did not report them as immigrants!—B. TULLOCH (Brig.-Gen.): Hill Court, Abergavenny, April 8, 1941.

BETHYLUS FUSCICORNIS JUR. IN DUMFRIESSHIRE (HYM.).—On July 8 last I beat a fine female of this fly from an elder tree near Gretna. This was a large specimen, being almost 4 mm. in length. My previous captures in this county were from Newton Moss on September 2, by sweeping in a wet place, and from Raeburn Flow on August 10. This last was swept from long grass on a hot afternoon. The two latter examples were kindly determined by Dr. O. W. Richards.—JAS. MURRAY; 6, Burnside Road, Gretna, Dumfriesshire.

A NEW *TEREDOLAEMUS* FROM NEW BRITAIN (COLEOPTERA, COLYDIIDAE).

By H. E. Hinton, Ph.D.,
Department of Entomology, British Museum (Natural History).

I have to thank Mr. G. E. Bryant of the Imperial Institute of Entomology for the opportunity of studying the interesting species described below. It was bred by Mr. J. L. Froggatt from the stem of a cocoa tree, together with a number of Scolytids. The larvae may be predaceous on the young of the bark-beetles or other wood-borers, as has been proved to be the case with the larvae of the Bothriderini.* The gut of two adults examined contained only fungi, pieces of hyphae and a large number of spores.

The genus *Teredolaemus* includes ten species, two from Madagascar, one from Japan, and seven from the Oriental region.

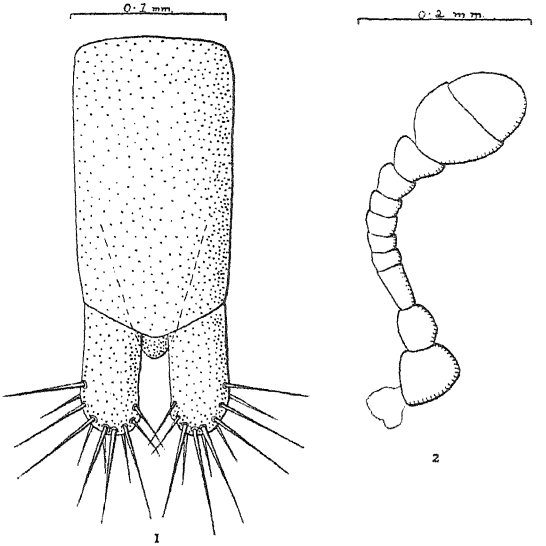
Teredolaemus pilosus, sp. n.

(Figs. 1, 2.)

Male.—Length, 2·0–2·3 mm.; breadth, 0·79–0·93 mm. Body elongate, subcylindrical; dorsal surface clothed with long (0·16–0·19 mm.), fine, dense, erect, golden-testaceous hairs; ventral surface with hairs much sparser, shorter and frequently recumbent. Cuticle shining, reddish-brown; elytra just behind middle with a large, transverse, irregularly oval, black or dark rufo-piceous area which includes intervals one to seven; in immature specimens most of the elytra, antennae, mouth-parts and legs are brownish-testaceous. *Head* with round, deep punctures one-fourth to one-third coarser than facets of eyes and separated by one-half to one diameter. Antennae (Fig. 2) with relative lengths of segments as figured; club with apical part (representing 11th segment) more finely and densely pubescent than basal. Clypeus with fronto-clypeal suture strongly arcuate and finely but distinctly impressed; anterior margin, when seen from front, nearly truncate; surface slightly more finely and sparsely punctate than head. Labrum with anterior margin very feebly rounded, nearly truncate; surface densely and very finely punctate. *Pronotum* across broadest point, which is at about middle, broader than long (0·79 mm.–0·65 mm.), and base broader than apex (0·73 mm.–0·63 mm.). Sides moderately strongly and evenly arcuate; base completely margined and nearly evenly arcuate. Surface evenly and strongly convex; punctures slightly coarser but otherwise similar to those of head. *Elytra* more than twice as long as pronotum (1·56 mm. : 0·65 mm.). Elytra with middle apical fifth feebly depressed. Striae nowhere distinctly impressed; strial punctures on basal half of disk round, moderately deep, one-fourth to one-half as broad as intervals, and separated longitudinally by one to three diameters. Intervals flat and each with a single row of more or less

* Burke, H. E., 1919, "Notes on a Cocoon-making Colydiid," *Proc. ent. Soc. Wash.*, **21**: 123–124. Craighead, F. C., 1920, "Biology of some Coleoptera of the families Colydiidae and Bothrideridae, *loc. cit.*, **22**: 1–13, 2 pls.

regular median punctures which are one-half to two-thirds as coarse as strial punctures and are usually slightly sparser. Pubescence arising from punctures of striae and intervals consisting of long, erect hairs as described above. *Prosternum* between front coxae about one-fourth as broad as coxae; surface with deep, usually slightly transverse punctures which are nearly as broad as third antennal segment and are usually separated by one-fourth to one diameter. Hypomera with similar but contiguous to sparser punctures and also with a fine, longitudinal, alutaceous microsculpture. Metasternum with median longitudinal line moderately fine and confined to basal three-fifths: disk with punctures about as fine as facets of eyes and



FIGS. 1, 2.—*Teredolaemus pilosus*, sp. n. (1) Dorsal view of male genitalia. (2) Dorsal view of right antenna.

separated by two to five or more diameters; sides with punctures gradually becoming coarser and denser, so that near lateral margin they are similar to those of prosternum, surface between punctures with a fine oblique or longitudinal, alutaceous microsculpture. Abdomen without carinae on first sternite; surface of sternites punctate like metasternal disk but much more densely so.

Genitalia (Fig. 1) as figured.

Female.—Externally similar to male.

Type.—A male in the British Museum (Natural History). New Britain: Rabaul, Bainings, 10.ix.1940, bred from stem of cocoa tree (*J. L. Froggatt*). *Paratypes:* 23, with same data as above.

Comparative notes.—From all other species of the genus having maculate elytra, it may be immediately distinguished by the long, dense pubescence of the dorsal surface. Most of the species of *Teredolaemus* are glabrous or nearly so, but *T. politus* Lewis (1878) of Japan—a black species—is densely pubescent.

NOTES AND OBSERVATIONS.

APLASTA ONONARIA IN 1939 AND 1940.—May 18 was the first date in 1939 when larvae were seen. There were six of them, all except one small and brown, and evidently just out of hibernation. At the next visit on the 24th they were much more numerous. Of the 25 seen, 2 were still in the brown stage, 5 about two-thirds grown, and the rest about half grown. On June 3 the number was 19, and it seemed probable that some had already spun up. On the following day 18 were seen, 13 of which appeared to be new discoveries. A few of the larvae were kept, and one, taken on June 3, proceeded at once to spin up in the netting above the food-plant on which it was put.

The larvae were found at both the spots where the moths had been noted in 1938, but this year a minor tragedy occurred. Some misguided though doubtless not ill-intentioned people had started certain excavations and were dumping quantities of chalk in a hollow. Unfortunately they had chosen for this purpose the site of one of the colonies. The only thing to do was to transfer as many of the larvae as could be found to the other colony. This was done, not a day too soon, as events soon proved. It is pretty certain that the rest of that colony was destroyed.

The rest harrow is not altogether a suitable plant for larva beating, and with *Aplasta ononaria* one is reduced to the simple method of using one's eyes. At first it is extremely difficult to see these larvae at all, but with practice one can pick them out quite successfully. After sufficient experience I began to feel that I had made the acquaintance of all that were there. If this idea was not an illusion then their total number was not more than about 50, and they appear to occur nowhere else in the Warren or even in England. They have an odd habit of moving a yard or so every day (or night) like a herd of grazing cattle. Another peculiarity is to bite half way through the stem of a plant two or three inches below the tip, so that the end hangs down and eventually withers.

It is clear that in their natural state they come out of hibernation at about the middle of May (though by no means all at the same time) and are full-fed in two or three weeks. In captivity they had so far failed to exhibit this rapid growth. Even when provided with plants specially grown for their benefit they had done no more than nibble in a half-hearted way, and had invariably ended by slowly perishing from inanition. Something was evidently lacking in their treatment and this was the subject of much anxious thought. The solution, when discovered, was simple enough, and lay in their habit of biting the stems of the food-plant, which suggested that they were thirsty creatures. A liberal application of water every day worked a small miracle, and I soon had the pleasure of seeing the larvae I had kept display a perfectly normal appetite. In due course they spun up, concealing their cocoons either among the leaves of their food-plant or in the folds of the lace netting above it. The first moth emerged on June 29, and this appears to be the first ever bred from

an English larva. Four more (one of which was a cripple) emerged at subsequent dates, the latest being July 17. As to wild specimens, one was seen in the Warren on June 30, but I was unable to visit the place again until July 16, when 7 were seen. One was seen on the next day, and more after that. Evidently this was an earlier year than 1938, and there is no reason to suppose that the insects were less numerous. Two females were transferred to other patches of rest harrow in the hope of establishing new colonies, but no larvae were seen at either place in the following spring.

On 1940 not much can be said. As summer approached the Warren became, for reasons which may be guessed, less and less accessible. I managed, however, to pay two visits, the first on May 25, when 21 larvae were observed, and the second on June 3, when the number was 20, most of them full-fed. No further visits were possible after that, but at least it is satisfactory to record that the sole remaining colony, when contact was last made with it, was in a satisfactory condition.—A. M. MORLEY; County Education Office, Springfield, Maidstone, Kent, May 11, 1941.

BIRDS EATING BUTTERFLIES.—The only occasion on which I saw a bird attacking a butterfly in Malaya was near Kota Tinggi in Johore, about the beginning of 1938. I was standing beside the sandy bed of an all but dry stream, and was watching a ♂ *Papilio delessertii* Guér. come swinging fast down the stream bed towards me, flying in the erratic but purposeful manner that most swallowtails have. When it was about ten yards from me and three feet above the stream a species of bee-eater swooped at it *head-on* from slightly above. The two met with a loud crack, and the bee-eater continued its swoop upward, and disappeared over the trees. As far as I could see the bee-eater caught the butterfly in its beak, but the whole incident was so sudden and so quick that I could not be absolutely certain. The most remarkable thing about the incident was the noise of the impact. I imagine the relative speed of the two was between 30 and 40 m.p.h., and the sound would have been audible in the open 40 yards away. I was most impressed by the skilful manner in which the bee-eater caught the butterfly. If bee-eaters can catch such big and powerful butterflies so effortlessly, I have no doubt that they would find weaker species that fly in the open, such as *Terias*, easy victims. I have occasionally watched birds attacking cabbage whites in this country. The attacks have always been from the rear, and have never been successful.—J. N. ELIOT, Capt. R.A.; H.Q. 4 Corps, Home Forces.

DRAGONFLIES IN 1940.—The hot sunshine of May caused early appearances of most Odonata; by the 4th a yellow male *Libellula depressa* L. was hawking from a bush at Hastings, and some half-dozen *Pyrrhosoma nymphula* Sulz. were seen. On marshes near by on May 5 a *Brachytron pratense* Müll. was on wing, besides eight exuviae and a newly-emerged female; also several *nymphula* and a teneral *Coenagrion* sp. From West Surrey a teneral *Libellula quadri-*

maculata L. and more *nymphula* were reported by F. M. Luce. On May 7 several teneral *Cordulea aenea* L.; a male and a female *Coenagrion pulchellum* Lind.; one or two *C. puella* L. and a teneral *Ischnura elegans* Lind. turned up at Byfleet, where F. M. Luce saw *aenea* and *puella* on the 6th, besides six *elegans* on the Guildford canal. *L. quadrimaculata* was in fair numbers (one mature male) at Esher Common on May 9, as was also *Enallagma cyathigerum* Charp., with two adult *nymphula*. Byfleet produced a mature female *Erythromma najas* Hans. on May 11, with a possible teneral *Agrion*. A male *depressa* was largely blue by the 13th. By May 17 some twelve *Gomphus vulgatissimus* L., most teneral, were out near Brockenhurst with a few *nymphula* and one *aenea* (uncommon there); a few teneral *Agrion virgo* L. seen. Several mature *Agrion splendens* Harr. and a *Platycnemis pennipes* Pall. were seen at Byfleet on May 21; but F. M. Luce had seen both at Pyrford, besides a teneral *Somatochlora metallica* Lind. (identified by the yellow dots at base of abdomen) at Byfleet, on the 18th, and on the 19th a *Cordulegaster boltonii* Don. near Godalming. Near Tunbridge Wells *C. boltonii* was first seen just out on May 30, while no *S. metallica* was to be found among the many *aenea* there, though several were on wing at Byfleet next day.

The first *Anax imperator* Leach was seen at Hastings on June 1 and near Godalming on the 4th, when a few blue and many immature *Orthetrum coerulescens* Fabr. turned up, also, but no *Ceriagrion tenellum* Vill. till the 7th and only three tenerals then owing to drainage of its haunt.

Some eight *Orthetrum cancellatum* L. were about Pen Ponds, Richmond Park, on June 8—all but one mainly bluish; a few *najas* on Kew Lake, a rare locality. By June 19 about twenty *Lestes sponsa*, Hans. with two nearly mature males were on wing at Arbrook Common. Two mature males of *Aeschna cyanea* Müll. were hawking along a deep shady bank at 7 p.m. on June 20 at Hastings, while a teneral *Sympetrum sanguineum* Müll. and exuvia were found at a pond nearby.

In Richmond Park several *Sympetrum striolatum* Charp. were just out on June 24, but a possible red male of this species was on wing on Hastings marshes the day before. By June 29 some ten *Sympetrum danae* Sulz., mostly teneral, were seen at Esher Common with one or two teneral *striolatum*; and one or two *Aeshna grandis* L. at Arbrook Common; a pair of *najas* remained for some ten minutes half immersed and fifteen minutes submerged several inches, while ovipositing on *Myriophyllum*. *E. najas* and *C. aenea* were recorded from Battle in June, and from Ashburnham Park *C. puella*, *I. elegans*, *E. cyathigerum*, *S. sanguineum*, *L. depressa*, *L. quadrimaculata*, *C. aenea*, *A. imperator*, *A. cyanea*, *A. grandis* and *C. boltonii* on June 30. A single *Aeshna juncea* L. appeared on July 8 at Esher Common with swarms of *S. danae*. A male *pratense* was last seen near Hastings, with a few *depressa*, on July 11; a male *boltonii* on the marsh there on August 4–18 points to it being resident near. The first *Aeshna mixta* Latr. was hawking about Guildford Station for twenty minutes on July 31; several at Hastings by August 3. *A. cyanea* usually seems to hawk

in shade or half-shade ; but on August 18 three males were on wing in full sunshine for a considerable time between 10 and 11 a.m. over a marsh stream, and in another spot at 2 p.m. on September 1 three at once at a small pond quite without shade. Unusually late dates were recorded for several Zygopterids. *A. virgo*, 2 ; *S. metallica*, near Tunbridge Wells, August 20. *C. pulchellum*, Hastings, August 24. *A. imperator*, Richmond Park, August 26. *P. nymphula*, near Tunbridge Wells, August 31. *A. splendens*, *P. pennipes*, Byfleet, September 2. *C. puella*, *O. coerulescens*, near Tunbridge Wells, September 6, with other species not seen later owing to lack of opportunity, though *C. boltonii* was probably here on September 17. *A. grandis*, *I. elegans*, 2, *E. cyathigerum*, 4, Hastings, September 14. Last dates from South-west Surrey were : *E. cyathigerum*, *A. grandis*, *A. mixta*, 2, October 5 ; *A. juncea*, pair, October 7 ; *A. cyanea*, October 12 ; *L. sponsa*, October 25 ; *S. danae*, *S. striolatum*, 2, October 29 (F. M. L.) ; *A. mixta*, 1 or 2, *A. cyanea*, *S. striolatum* were seen at Iffley, Oxon, on October 22.—H. G. Attlee ; Kingham Hill, Oxon.

The International Rules (see p. 132, footnote).

* With this remark I fully agree ; it demonstrates the value of the Code as the one and only protection for the serious worker (see *Entomologist*, **74** : 52). If, however, a writer prefers to use his own rules and names in opposition to the Code, he cannot complain if others do not follow his work. Mr. Hudson finds priority useful if "tempered" with common sense, which simply means if it can be applied or ignored as the individual wishes : this kind of alternating rule would be of as little value to most people as an alternating principle. The suggestion that "scientific" had any meaning for Darwin other than the most absolute accuracy in every detail is a travesty of fact that need not be taken seriously.—B. C. S. Warren.

SOCIETIES.

The South London Entomological and Natural History Society.—*December* 14, 1940.—Mr. F. Stanley Smith in the Chair.—Mr. J. A. Stephens presented the Society with four volumes of Tutt's *British Noctuae and Their Varieties*.—Mr. S. N. A. Jacobs exhibited two species of *Coleophora*, *C. lineola* Haw. and *C. apicella* Stain. and their larval cases, and referred to Meyrick's error in his *Revised Handbook* ; Mr. Hy. J. Turner, two species of the exotic genus *Parthenos*, *P. tigrina* v. *aspila* from N. Guinea, and *P. sylvia*, and local races from the Malayan Islands and India ; Mr. J. A. Stephens, several local beetles from a straw heap near Chatham, including *Stilicus fragilis* Gr., *Pogonochaerus dentatus* Pz., and *Acidota crenata* Fb., and also *Clerus formicarius* L. from Cobham Wood under bark of fallen oak ; Mr. E. E. Syms, examples of the Cluster Fly, *Pollinia rudis*, a parasite of earthworms ; Mr. S. R. Ashby, a large number of insects, mainly Coleoptera, taken in the New Forest. The Chairman opened a discussion on "Memories of the New Forest." Mr. Coote read extracts from a series of entomological notes made by an entomologist some 60 to 70 years ago.

January 11, 1941.—Annual Meeting.—Mr. C. N. Hawkins in the chair.—The Balance Sheet and Treasurer's Report and the

Council's Report was presented and passed. Votes of thanks were passed to the retiring President, the Council, the Officers, and the Auditors. A special vote was passed to the Hon. Secretary, Mr. S. N. A. Jacobs, who was retiring after nine years in office. Mr. Jacobs replied. There was no Annual Address from the chair.

ORDINARY MEETING.—The new President, Mr. F. D. Coote, took the Chair.—Mr. C. N. Hawkins exhibited living larvae of the Chafer, *Amphimallus* (*Rhizotropus*) *solstitialis* L. found under a lawn at Wimbledon.

February 8, 1941.—Mr. F. D. Coote, President, in the Chair.—The decease of Mr. P. M. Bright through an accident was reported.—Mr. S. R. Ashby exhibited a fine series of the Coleopteron, *Osphya bipunctata* Fb. from Huntingdonshire, especially Monks Wood, and called attention to the marked sexual dimorphism in the great variation in size and development of the femora of the males.—Lantern slides of many natural history objects were then shown by Miss Brooke and Messrs. Burton, Dennis and Finnigan.

March 8, 1941.—The President in the Chair.—The decease of two members was reported: Mr. W. H. B. Fletcher of Bognor Regis and Mr. H. O. Holford of Godalming. Mr. S. R. Ashby exhibited the so-called Plaster Beetles, *Enicmus minutus* and *Lathridius nodifer*, and *Cryptophagus acutangulus*; Mr. W. O. Steel, many Hymenoptera which he was placing in the Society's collection; Mr. S. P. Doudney, a specimen of *Macrothylacia rubi*; Capt. Jackson, examples of *Eurois occulta* from Hants and Rannoch, and *Lycia hirtaria* from London, Purley and Bishops Waltham; Dr. G. V. Bull, parasites bred from larvae of *Aglais urticae*; Baron de Worms, a series of *Triphaena comes* bred from a buff-coloured female taken near Forres, a series of *Agrotis ashworthii* bred from N. Wales larvae, captured specimens of *Oria musculosa* from near Salisbury, and a bred example of *Callimorpha dominula* from Wiltshire, grey-brown in ground-colour with orange tinge, blurred cream spots, with hind wings pink and usual black markings grey brown. Mr. Nixon read a paper on Social Insects.—HY. J. TURNER (*Hon. Editor of Proceedings*).

THE MANCHESTER ENTOMOLOGICAL SOCIETY. —*November* 16, 1940.—Mr. H. Britten took the Chair for the Council Meeting, and Mr. H. Kitchin, President, occupied it for the General Meeting which followed. Mr. G. J. Kerrich, M.A., read an intersting paper, How Insects get Air, comparing insect respiration with that of Vertebrates. He dealt with the obtaining of air by such water insects as *Notonecta*, *Corixa*, mosquito larvae, and mayfly and dragonfly larvae, as well as the remarkable tapping of air-stores of plants by larvae and pupae of *Donacia*. Exhibits were shown by the following members: Mr. J. E. Cope, Coleoptera from Ashton Moss, 1940; Mr. J. H. Murgatroyd, the following Coleoptera, *Triplax aenea* Schal., *Acilius sulcatus* L., and *Dytiscus marginalis* L.; Mr. T. H. Hanson, 3 drawers of life-histories of Lepidoptera from the Baron Bouck collection, showing Lasiocampids, Notodontids and Arctiids; Mr. P. Meek, Coleoptera, and parasites of *Cassida rubiginosa* Müll.; Mr. H. L. Burrows, *Boreus hyemalis* L. (Mecoptera) from Alderley Edge, and the Tabanid

fly *Tabanus plebeius* Fall. from Delamere ; Mr. H. Britten, *Tabanus plebeius* Fall. from Delamere, and the beetle *Othius punctulatus* Goez. with its var. *donisthorpei* Chitty ; Mr. H. N. Michaelis, some interesting Lepidoptera taken during a short holiday in 1940.

January 25, 1941.—Mr. G. S. Kloet, Vice-President, in the Chair. —Pocket-box exhibits were shown by the following : H. Britten, Diptera taken autumn, 1940, being recent additions to the British List, and one new to science, *Bolitophilus triangulata* Edw., *Dziedzeikia janickii* Dz., *Anatella turi* Dz., *Brachypeza armata* Winn., *Paradicranota* sp. nov. from Goyt Valley ; J. H. Murgatroyd, 48 species of *Bembidium* taken by Mr. Joseph Collins, of Oxford ; J. E. Cope, 3 species of *Apion* from Ashton Moss, and others from Ruislip ; G. C. Bartindale, a few specimens to illustrate aberrations, etc., in Coleoptera ; H. N. Michaelis, a drawer from his collection showing the Pugs, *Eupithecia* Curt. ; T. H. Hanson, a drawer of life-histories from the Baron Bouck collection, showing various Agrotidae, also types and extreme aberrations of the following 3 species, *Spilosoma lutea* (*lubricipeda* L.), *Abraxas grossulariata* L., and *Pieris napi* L. ; C. H. Frost, a small nest made by the queen of *Vespa germanica* F., Alderley, Ches. ; G. J. Kerrich, Ichneumonid parasites, viz. one from *Eupithecia pulchellata* Steph., and *Spilocryptus saturniae* Boie from *Saturnia pavonia* L. ; G. S. Kloet, 5 species of "imported" cockroaches, viz. *Blatella germanica* L., *Blatta orientalis* L., *Periplaneta americana* L., *surinamensis* L., and *australasiae* F. ; L. Nathan, *Mesoleuca albicillata* L., Delamere, July, 1939, *Vanessa cardui* L., bred Wilmslow, 1939, *Acherontia atropos* L. taken Bramhall, Ches., June 3, 1940.

February 15, 1941.—Annual Meeting.—Mr. H. Britten in the Chair. Owing to the unavoidable absence of Mr. H. Kitchin, the Presidential Address had to be postponed. The reports of the Secretary, Treasurer and Librarian were read and approved. Exhibits were shown by the following members : Miss B. Harthan, larva of Stone-fly (*Perla*), and an immature *Velia currens* F., both in spirit, and taken in the Kinder Valley, August, 1940 ; Mr. J. E. Cope, a few species of *Apion*, *Haltica* and *Elater* taken Ruislip Common, Mdx., September, 1940 (Coleoptera) ; Mr. T. H. Hanson, a further drawer of life-histories from the Baron Bouck collection showing Agrotidae : Mr. G. J. Kerrich, the life-history of the Colorado Potato-beetle (*Doryphora decemlineata*) ; Mr. G. S. Kloet, some exotic Papilios ; Mr. H. Britten, a species of Chironomid, *Spaniotoma dissipata* Edw., taken at Tintwistle, Cheshire, February 9, 1941, new to the Lancs. and Ches. List ; Mr. L. Nathan, *Mormo* (*Mania*) *maura* L., bred South Manchester, 1940, *Cosymbia* (*Leucophthalmia*) *punctaria* L., bred Delamere, 1939, and a small pale form of query *Oporinia dilutata* Bhk. bred October 6, 1940, from Cotterill Clough, Ringway, Ches.— L. Nathan (*Asst. Hon. Secretary*).

Erratum.—1940, *Entomologist*, **73** : 39, line 18. For *makuta* read *makula*.

OBITUARY.

P. M. Bright, F.R.E.S., J.P.

Percy May Bright was the son of a missionary and was born in India in 1863; he was killed in a motor accident on February 7 last. After leaving Mill Hill School he had a distinguished municipal and business career, and had been a member of the Bournemouth Town Council since 1924 and an Alderman since 1931. He was Mayor during the years 1929–30 and 31 and served on numerous committees. His life was identified with the rise and development of Bournemouth and his portrait hangs in the Council Chamber. He was the first Hon. Secretary of the Bournemouth War Service Organization formed at the outbreak of the war. He was greatly interested in temperance, religious and charitable associations, and was Treasurer to the Royal Victoria Hospital, for which he assisted in raising over £250,000. When in 1923 he received a cheque for £250 from his colleagues on the Town Council as a mark of their appreciation of his services to Bournemouth, he immediately handed over the amount to the hospital. He had been Chairman of the London Missionary Society, and was one of a deputation that in 1922 and 1923 toured the world visiting missions and outposts. He was appointed a Justice of the Peace in 1917. He is survived by an only daughter, Mrs. Philip Hardy, who acted as Mayoress during her father's Mayoralty. His wife died in 1939 after an illness lasting for very many years.

His only hobby was entomology, and he spent all his holidays collecting in England and Scotland. As is well known he possessed a remarkable collection of British Lepidoptera. The Heterocera were acquired by the late Lord Rothschild some years ago and now form part of the Tring Collection. The Rhopalocera he continued to collect and in course of time formed the most comprehensive private collection in the country, containing many hundreds of remarkable aberrations. The collection, with the exception of the *Lysandra coridon*, will be eventually sold by auction. The series of *L. coridon*, containing the originals of the unique and extraordinary aberrations figured in the *Monograph on Lysandra coridon* of which he and Mr. H. A. Leeds were joint authors, is left to the South London Society.

His many entomological friends will greatly miss him, as he was always willing and pleased to show his collection to visitors interested, although it required a great deal of time to look through the 200 odd drawers. The funeral service took place at the Richmond Congregational Church and was attended by a very large concourse of people. The Mayor and Corporation and the Corporation staff of the City and representatives of religious, social, hospital, political and other sections of the community were present. He will be mourned by a wide circle of friends who realized his sincere and straightforward character, and generosity to those who needed aid.

S. G. C. R.

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POLYOMMATUS ICARUS (ROTT.): AN ACCOUNT OF ITS VARIATION IN NORTH LANCASHIRE AND SOUTH WESTMORLAND.

BY ALBERT E. WRIGHT, F.R.E.S.

HAVING observed this butterfly in Grange-over-Sands and the surrounding district for a number of years, and having examined or taken all that showed any trace of variation, I have now amassed sufficient material to enable me to offer a detailed and comprehensive description of the various aberrations exhibited by *P. icarus* in this part of the country. I have also searched the relevant literature and extracted any notes written by others who have visited here. These are very few in number, and I conclude that they have not taken any aberrations which they considered worth recording.

The butterfly is common; in some places really abundant. In late June and early July hundreds may be found at rest on the long grasses and rushes. The best time of day for searching is from 7 o'clock in the evening till dusk, during which period many will be found congregated together in favoured spots. It is indeed not unusual to find from 30 to 40 in a very small area. They can thus be examined for underside variation without touching or disturbing them. They are often accompanied by *Aricia agestis*. The females may usually be identified by the darker warm brown colour, and may be carefully lifted off, further examined for upperside variation, and allowed to fly if not wanted. Some of the males however are very deceptive, being almost as brown as the females, and I have occasionally brought them home, thinking they were that sex till the upperside was seen.

We have two generations in each year, one in June and July, another from August to early October. The first brood is by far the most numerous, and is altogether the finer and larger brood, the average size being about 35 mm. I have a number of both sexes with an expanse of over 38 mm. Specimens of the late brood are more variable in size but on the whole definitely smaller. I have a female taken at Kents Bank, Grange, September 6, 1935, which measures no more than 24 mm., and three others, all females, that are only 25 to 26 mm. These were all taken in 1935, so it appears there must have been some unfavourable conditions prevailing during that year to account for so many dwarf examples.

Our local race of *icarus* is a very fine one, and the amount of blue in the females unusual. Mr. Massey (*Ent. Rec.*, **20** : 144) remarks on the large size of this species in the North of England compared with the South, and particularly notes that Grange and Irish specimens are larger than the Scotch and other races. Mr. James (*Ent. Rec.*, **16** : 298) mentions the Witherslack males as large, one in particular as brilliant in colour as *Lysandra bellargus* and the females strongly marked. Tutt, however, states that some of the Scottish islands produce a fine brilliant race similar to Irish examples (*British Lep.*, **11** : 128), and states that the largest specimens he had seen came from the Isle of Lewis.

In all my experience I have never seen a single gynandromorph or even heard of one being taken in our area ; not a single specimen on either upper or underside suggests it. Teratological examples are very rare. I have one in which the right fore wing is concave or hollowed out towards the centre of the outer margin ; two others are like it, but more modified. The white fringes are perfect in each case.

Males, Upperside Variation.

The colour is fairly uniform in both broods and I can see little difference between them in this respect, both being of a bright light blue. Some are tinged with a lilac shade. A few are wholly blue right up to the costa, but these have a narrow basal border of white on the edge when looked at from the head ; the majority have a slender white costal streak from the base to $\frac{3}{4}$ and in some specimens this reaches the tip. In many the streak is wider and more pronounced, and in such case is usually covered by light blue scaling. Occasionally one finds examples with black spots present near the border of the hind wings, but this form may be considered of rare occurrence. I have records of two examples with black dashes at the end of the nervures running through the fringe as in *Lysandra bellargus*. Mr. Frank Littlewood has one that he took in the Kendal district which shows this well, and is the best I have seen. Another of the same form was exhibited at the City of London Entomological Society by Mr. Grosvenor on October 2, 1905. This was taken at Witherslack. It is an extremely rare form and I have myself never taken it. I have one example in which the blue is of a lighter shade and more shining. It is a perfectly fresh specimen, but somewhat transparent, as the darker blue venation can be seen through the scales.

Male Underside Variation.

The ground-colour ranges from light to a darkish grey, but many examples approach the browner colour of the females. In the

grey forms the hind wings are usually much darker and of a browner tint, with in many cases a quantity of delicate light blue scaling near the base. In two large specimens these scales occupy fully the basal third. The spotting is very variable, and we get some curious forms. The two basal spots are usually present, but my series, which are picked forms, give an average of 80 per cent. with two spots, 10 per cent. with one, and 10 per cent. entirely without (ab. *icarinus*). I have seen many more of the *icarinus* form and it therefore cannot be considered as rare.

A number have the basal spots asymmetrical as follows (viewed as set with underside showing) :

Left side.		Right side.
5 with two spots.	.	2 with one.
2 ,, one spot.	.	5 ,, two.
1 without.	.	1 ,, one.

There is much variation in the size of these basal spots, some in my series having them large and distinct and heavily pupilled, others only faint and without pupils ; some have the upper spot pupilled and the lower immaculate. The size of the spots also varies ; frequently the upper spot is small, in other cases the reverse applies. Tutt states that three-spotted varieties may be considered common in the South of England, but this is certainly not the case here. I have examined my series and do not find a single example amongst my males. In two examples the upper spot is transversely elongated, while in one the same applies to the lower spot.

The discoidal on the fore wings is also variable ; some have the black pupil prolonged upwards into a strong black streak, in others the pupil is faint, and in one specimen taken at Grange-over-Sands, June 30, 1932, it is absent, the white in this case being immaculate.

The submedian row usually consists of six spots, but often the lowest or geminate spot is divided into two, each with a small pupil. When this is the case it gives seven spots to the series. I have ten of such seven-spotted males. The arrangement of the submedian spots is often curious ; sometimes they are in an almost straight row, in other cases curved, and grouped together to form an arc round the discoidal (ab. *glomerata* Tutt). I possess perhaps a dozen with only five spots in the series, the geminate spot being absent.

Two examples taken at Grange-over-Sands, July 20, 1935, July 7, 1937, have five spots on the right and four on the left sides. Another taken here on July 27, 1933, appears to be four-spotted, but under a strong lens the costal spot is discernible as a narrow streak of dark scales. Another is similar but has the costal spot very minute and ocellated with a tiny pupil.

In the submedian row the spots are very variable in size. The ocelli are present in all the examples I have except that in a few cases the geminate spot is without a pupil.

One of the best insects in my series was taken at Grange-over-Sands on June 20, 1936. The basal and discoidal spots are not much larger than usual, but the submedians are very conspicuous. The costal spot is lanceolate or pear-shaped, the point being outward. The other spots are rounder, and the whole series with the exception of the geminate spot are in size 2 mm. with very large pupils. The geminate spot is much narrower. The hind wings are almost normal. It is the largest spotted *icarus* I have seen.

The submedian row is usually followed outwardly by a row of dark brown crescentic spots which form a border to the orange spots. These in many cases form a strong band from the costal to dorsal margins. In others they are very faint, almost obsolete. I have six males in which the band is continuous and strongly developed.

In the male sex, only in a few cases are the orange spots well developed; in most cases they are faint or obsolete. The best I have is one with a strong orange border taken at Cark in Cartmel on September 28, 1933, and therefore of the second brood. This has the submedian row almost straight, only the costal spot being slightly inward.

I have no males with coalesced spots; this phase of variation in our area seems to occur only in the females, which will be mentioned later. The hind wings are not very striking. The white streak is generally present, but in four examples it is very faint, figuring only as a white dot. The white central spot often contains a small pupil or eyespot; in others it is immaculate. As regards the usual hind wing spotting I have one specimen with no pupilled spots and only with traces of the white—Grange-over-Sands, July 12, 1935. It has a few orange and black spots near the border.

Many others are irregularly spotted, some without pupils and many with spots obsolete, but the two near the upper border seem to be the most persistently pupilled.

The orange band on the hind wings is much stronger than on the fore wings, and more nearly approximates to the females in this respect.

Females Upperside Variation.

This section is the most difficult part of my task. The fine gradations of the brown and blue are troublesome to describe. They show some wonderful and beautiful combinations of colour, and I have never seen them surpassed, and only equalled by a short

series I have from County Clare, Ireland. They start with a light to dark brown with only a few blue scales near the base ; from this they take on more and more blue till they approach the same extent of blue as is exhibited in the male sex, except that they usually have some or all the orange spots present. In some cases the orange band is faint and in a few cases obsolete. When this is so they have generally a wide dark border inside the fringes.

The blue colour is always much deeper in tint than in the males. Only by seeing a long series can one realize the lovely combinations and gradations of the brown and blue scaling.

I have a few with the ground-colour all brown, but with the orange spots present, the best being one taken at Cark in Cartmel on August 24, 1935. This second brood specimen is small and would, without consulting the underside, be readily mistaken for an *Aricia agestis* female. Often we take females with the black discoidal on fore wings ringed by white scales, similar in this respect to ab. *albiannulata* of *agestis*. I have several of them. A few of this form have in addition a dull white spot in the centre of hind wings. I have seven of this aberration which remind one of a form of *quadripuncta*, but with the fore wing discoidal pupilled and the hind wing immaculate.

The hind wings often have a row of triangular white marks inside the orange band. I have one without any orange spots, but the row of black spots nearer the border present.

A large specimen has the three spots nearest the costa on fore-wings dullish white instead of orange and in many these spots are grey. In several of the browner specimens the upper two or three spots are light blue in colour (= *apicata* Tutt). Frequently we get a form with the orange spots strong and almost joined together, forming a strong bar, approximating to some of the females I have from County Clare. Several have a blue triangular streak on hind wings, the wider base being just above spots 3 and 4 and the point inwards (ab. *iphis-cuneata* Tutt). Occasionally the brown hind wings have streaks of light blue on the veins, giving a striated effect which is very pretty.

It is impossible in words to express the extreme beauty of some of the variegated forms of *icarus* females ; some of them with a large patch of blue in the centre of the fore wings surrounded by dark brown are very effective.

Female Underside Variation.

The ground-colour ranges from light grey to a darker tint of the same colour, but the bulk are brown of various shades, the hind wings usually being darkest. I have one specimen which is

very dark, almost fuscous. At the other extreme, one I took at Grange-over-Sands, July 17, 1932, and others approaching it, are ashy white. The spotting generally is much stronger in this sex, and in a few specimens the spots are so large that the underside appears to be crowded; these are referable to ab. *crassipuncta* Courv. I have only two of the ab. *icarinus*, a form which is apparently much more common in the males; another approaches it, having only a minute upper spot. I find that I have two only, out of all my series, with three basal spots, and these are only present on the left side. In one the upper spot is divided, in the other it is the lower. The number of those with the basal spots asymmetrical or reduced are as follows:

Left side.		Right side.
3 with one spot.	.	3 with one.
1 ,, one spot.	.	1 ,, none.
1 ,, two spots.	.	1 ,, one.
1 ,, one spot.	.	1 ,, two.
2 ,, three spots.	.	2 ,, two.

Considering that I have a much more extensive series of females, the above appears to suggest that the basal spots are more often present in that sex. In a number of cases the lower basal spot is elongated outwards as though inclined to coalesce with the geminate spot. In others it is elongated inwardly, whilst some have both elongated transversely. The discoidal is present in all, and is usually pupilled; in only one case is it faint. The spots of the submedian row are generally much stronger than in the males, and distinguished by the large black pupils. In three cases only is the geminate spot divided into two distinct pupilled spots. It is often very strong, and bent towards the lower basal spot, as though ready to coalesce but more often bent towards the margin. Three specimens have five spots only, but none has four or less, except in the case of ab. *persica* Bien. This summary of the spotting in the females is very different from the summary I have already given of the males, and shows clearly the stronger spotting of the former.

I have one fine aberration which has a pure white streak on fore wings. This begins near the base, goes through the upper basal and continues through the discoidal, and a small distance beyond. This specimen was taken at Grange-over-Sands, July 15, 1930. I have several more of this aberration, but not so clear, the streak being duller, so apparently it is inherent in our area and likely to recur. For this aberration I propose the name **albistria** n.ab. I have not read of a similar form having been taken elsewhere.

Three examples have all the spots very large, including the discoidal and basal, and also all the spots on hind wings; the ground-colour of these is darker than average specimens. Coalescence is far from common in our district. I have only fifteen examples out of the thousands I have examined showing this phase of variation. In the most common form the lower basal unites with the geminate spot (*melanatoxa* Marott). One has the spots united on the left side, the right being normal. Another has the basal and geminate spots united on the right side but on the left the arc is divided into four distinct black spots. I have one example in which the two upper spots on hind wing have joined (*basijuncta* Tutt), and I saw another of the same aberration taken at Cark in Cartmel in 1936.

I notice that Prof. Harrison and Mr. Carter, in *The Vasculum*, **15**, No. 1, have named a form that has an additional spot near the border, inside the row of four inner spots. I have females of this aberration, but no males (ab. *codrus* Carter and Harr.). In the *Entomologist*, 1936, p. 95, I reported having taken, at Grange-over-Sands on July 6, 1935, a fine fresh specimen referable to ab. *persica* Bienert. This is without spots except the discoidals, the streaks present, the ground-colour darkish brown, but with almost white borders. On the same evening I took one with the usual spots on fore wings, but the hind wings almost spotless. I have many with hind wings with only two or three spots present in addition to the discoidal and streak.

I may state that all the insects referred to have been taken by myself and with three exceptions are in my possession, and have all been obtained in North Lancashire and South Westmorland. The great lack is the entire absence of the striated and radiated varieties. I have never seen or heard of one having been taken in our area, and the wonderful forms, shown in South's, Tutt's and Frohawk's books, are a feature we should welcome. A further deficiency is that of aberrations with coalesced spots, which are remarkably scarce here considering the numbers seen and examined. When we consider that *icarus* is so common, and Witherslack and Grange so well worked in the past, the paucity of recorded aberrations is remarkable. Apart from the lovely combinations of colour in the females, and the few insects before mentioned, my series is not very striking; the range of variation is a matter of detail, not showy, but no doubt useful to students interested in tracing the affinity of *icarus* to other species.

I have ignored most of the colour variations given in Tutt's *British Lepidoptera* (**11**: 130, 131). I have many of these, but they often overlap and in many instances are difficult to define. In the following summary I have mentioned those that are readily recognized by some clear distinctive character.

SUMMARY.

ab. *nigromaculata* Ckll.
,, *iphis-cuneata* Tutt
,, *caerulea-cuneata* Tutt
,, *discreta* Tutt
,, *persica* Bien
,, *parvipuncta* Courv.
,, *crassipuncta* Courv.
,, *icarinus* Scharf.
,, *caerulescens* Wheeler
,, *glomerata* Tutt.
,, *major* Tutt (over 35 mm.)
ab. *minor* Ckll. (20 mm.). (Tutt includes all to 25 mm.).
,, *melanotoxa*(= *arcuata*) P. Marott
,, *semiarcuata* Courv.
,, *elongata* Tutt.
,, *basijuncta* Tutt.
,, *apicata* Tutt.
,, *tripuncta* Courv.
,, *codrus* Cart. & Harrison.

Brunleigh,
Grange-over-Sands.

PAPILIO MACHAON IN KENT.—1940 was marked by what seems to have been a small invasion of Kent by *Papilio machaon*, somewhat similar perhaps to one that was reported during the last war. In May I saw at Ashford a specimen of the butterfly which had been captured by a small boy on or about the 18th of that month. Later on in the year Mr. Serpell of Sellindge, not far from Ashford, wrote to tell me that a full-grown larva had been found there at the beginning of July feeding on carrot and that two butterflies were seen in the neighbourhood on July 14, one of which was captured, while a third was caught round about that time. Quite recently I saw two pupae at a school near Canterbury and was told that three larvae had been found on carrot last summer, from one of which an imago was bred on September 6.—A. M. MORLEY; County Education Office, Springfield, Maidstone, May 13, 1941.

HIBERNATION OF VANESSA ATALANTA.—Mr. C. Granville Clutterbuck asks (*Entom.*, **74** : 114), Does *Vanessa atalanta* hibernate here? As far back as 1907 (*Entom.*, **46**) I recorded the first authentic instance of *V. atalanta* hibernating in this country, when one was found by the late Mr. Walter Barnes at Orpington, Kent, in February of that year; he found two others in 1908—all three were females. Also in 1908 Capt. E. B. Purefoy had five *V. atalanta* hibernate in his butterfly garden in Kent, which survived the whole winter. These are mentioned in my *Natural History of British Butterflies*, **1** : 158, and the *Complete Book of Butterflies*, p. 136. I may also add that Mr. C. H. Bouck has found *V. atalanta* in a state of hibernation just inside rabbits' burrows in January and early February at Ilfracombe in May, 1941.—F. W. FROHAWK; Borgan Cottage, Bargrennan, Newton Stewart, Galloway.

NOTES ON THE CYNIPID GENERA *CYNIPS*, *BIORHIZA* AND *MEGAPTERA*.

By M. Niblett.

Cynips kollari Hartig.—A great deal was written years ago about this insect and its gall, but possibly some recent observations of the gall and insects inhabiting it may prove of interest.

Kinsey (1) has decided that the genus *Cynips* is made up of a group of insects different from those included by European authors and he is probably correct; Rohwer and Fagan (2) renamed the genus to which the species under discussion belongs *Adleria*, but I propose to retain the name *Cynips* in this paper.

The gall is probably one of the most widely distributed of all the Cynipid galls, but it will be found to occur more abundantly in areas where scrub oak is plentiful than in those where large oak trees abound. The gall is too well known to require any description; it varies considerably in size, but mature galls average 20 mm. in diameter; according to Adler (3) the diameter is 15–30 mm.; Riedel (4) gives 10–26 mm.; Ross and Hedicke (5) 28 mm.; Dalla Torre and Kieffer (6) 12–28 mm.; Kieffer (7) 12–23 mm.; and Tavares (8) 20 or 30 mm. Measurements taken by me of a large number of what may be called normal galls gave an average diameter of 20 mm.; I have found but few very large galls, several 27 mm. and 28 mm. being the largest; undersized galls are often very plentiful, the cause being I believe in the majority of cases due to the *Cynips* larva perishing in an early stage. The statement frequently made that undersized galls are due to the presence of inquiline larvae is probably correct if they have encroached upon the larval cell of the *Cynips* and so caused the death of the occupant, but not otherwise. From two galls 10 mm. in diameter I had emerge in the second year two perfectly formed but considerably undersized *kollari*. Mr. J. Ross has informed me that he also had had the same experience. Synergi emerge in large numbers from normal-sized galls from which *kollari* has also emerged. Adler states that the gall appears in June; May 30 is the earliest date I have found it, but in some years June or July were the months when the first appearance was noted. The gall frequently remains attached to the twigs for twelve months or more.

According to Adler the insect emerges in September and October of first or from April to the beginning of June of second year; Riedel says autumn of first or June of second; Ross and Hedicke, August of first and June of second; Dalla Torre and Kieffer, August of first and June of second; Kieffer, August and September

of first; Tavares, August and September of first year. The emergences I have had have been in July, August, September and October of first, or June, July, August and September of second year, the majority taking place in August and September of both years.

I have collected series of galls at various times and kept them under observation for several years, the following records are a summary of some of the results. Taking first galls of average size (20 mm.) with no emergence holes: From 12 there emerged, in second year, 13 Chalcids, 96 Synergi and 6 *C. kollari*; from 8 galls, 9 Chalcids, 7 Synergi, 4 *kollari* in second year; from 18 galls, 1 *kollari* in first, 29 Chalcids, 76 Synergi, and 4 *kollari* in second; from 33 galls, 20 Chalcids, 240 Synergi, 10 *kollari* in second; from 15 galls, 4 Chalcids, 57 Synergi, 12 *kollari* in second; from 26 galls, 6 *kollari* in first, 6 Chalcids and 24 Synergi in second year. From under-size galls with no emergence holes there emerged, from 13, 5 Chalcids, 70 Synergi, 1 *kollari* in second year; from 9 galls, 14 Chalcids and 57 Synergi in second year. From 10 normal galls with emergence holes of *kollari*, 15 Synergi, 2 Chalcids and 3 Ichneumons emerged in second year; from 7 similar galls 2 Chalcids and 23 Synergi emerged in second year.

I have found a number of double galls; 1 yielded 1 *kollari*; 3 galls 1 Chalcid, 1 Synergus, 4 *kollari*; from a series of 7, 6 of which were undersize, 2 Chalcids and 28 Synergi emerged; while from 2 similar galls 2 Chalcids, 10 Synergi and 1 *kollari* emerged.

Triple galls I have found very few of; a series of 3 gave me 8 Synergi and 1 *kollari*.

In nearly every instance the Chalcids emerged in April or May of second year. On one occasion several emerged in June of second and upon another 1 Chalcid came out in August of first year. The Synergi were more varied in their emergence times. I had these out in August of first, in April, May, June, July, August and September of second, in June of third, and some in June of fourth year; the largest number emerged in June of second year. I regret that I am unable to indicate the species; I have not had time to study the insects myself and have found it impossible to get them identified.

The galls occur upon *Quercus robur* L. and *Q. sessiliflora* Salb., on which plants I have found them in 46 localities in Surrey, Essex, Sussex and Hampshire.

Biorhiza aptera Bosc.—Galls of this species are, as far as my experience goes, seen but infrequently; they must occur in numbers in many localities, as the alternate species is usually plentiful; the fact that they can be found only by digging round the roots of oaks probably accounts for the few records we have. I have found but

few myself both on *Quercus robur* L. and *Q. sessiliflora* Salb. ; from 26 galls collected in October 16 *aptera* emerged in November and December, followed by 8 Chalcids in the following August and 2 in October. Other series failed to yield either the gall-wasp or parasites. The statements that these galls occur upon Deodars, Plum, Beech and Vine which have been repeated by various authors for many years I view with strong suspicion; several attempts I have made to get these galls produced on roots of Plum have been entirely unsuccessful.

B. pallida Oliv.—The gall of this species, the familiar "oak-apple," is as a rule plentiful in the majority of districts where *Q. robur* and *sessiliflora* occur. I have noted a scarcity in certain districts in some years: in 1931 and 1939 I found very few indeed, although many areas were visited. The earliest date I have found the gall is April 9th, and old galls frequently remain on the trees for twelve months. All the *pallida* that I have bred have emerged in June except once, when I had 3 come out on July 15, the earliest date of emergence being June 11.

Much has been written about the various occupants of these galls, but a great many of these may be termed casuals. The gall-wasp usually emerges freely and in considerable numbers; from 1 gall I had 142 *pallida* emerge ; from 8 galls 77 *pallida*, 55 Chalcids, 5 beetles and 1 Ichneumon ; 5 galls gave 307 *pallida*, 2 Synergi, 4 Chalcids and 7 beetles ; while another series of 6 yielded only 8 gall-wasps, but in April and May of the following year 137 Chalcids emerged.

The larvae of the Coleopteron *Balaninus villosus* F. tunnel through the gall-mass, and when full-fed leave the galls in June to pupate in the earth, from which the beetles emerge in the following May. These larvae must destroy a considerable number of the gall-wasp larvae during the period they are in the galls, yet galls I have had that have been so infested have yielded large numbers of *pallida*.

Adler's statements concerning this species do not appear to agree with the observations of later workers, and Burkill (9) has recently drawn attention to these apparent discrepancies. The statement that *B. aptera* and the females of *B. pallida* are similar in appearance does not apply to any specimens I have seen or heard of; as regards the latter being apterous, this is true in some instances, but is I am inclined to believe a rare event, the proportion of wingless or semi-wingless females being very small indeed ; Burkill states he only had two wingless females in 40 years, while from about 1000 insects of this species I have bred 3 with partially developed wings (10). The further statement that some galls yield only males, others only females, while some yield both sexes is referred to by

several authors, but none appear to have verified it by personal observation. It may be correct, but is in all probability as rare an event as the occurrence of wingless females; all the galls of this species that I have had have yielded both sexes in fairly equal proportions.

Trigonaspis megaptera Panz.—I have had galls of this species from Limpsfield Chart, Bookham Common, Epsom Downs, Arbrook Common, Barnthorne Wood, Coulsdon Common and Broadmoor, Surrey; Epping Forest, Essex; Church Stretton, Shropshire, all from *Quercus robur* L., and from Croham Hurst, Surrey, on *Q. sessiliflora* Salb.

I have found the galls from April 2 to June 6, the majority occurring on the lower part of the trunks of well-matured trees. On one occasion a number of galls was found upon stems of young oaks just below ground-level. These galls were much softer and larger than any I had found above the surface and were entirely devoid of any red colouring matter; in fact they were quite unlike any other *megaptera* galls I have seen, but the insects bred from them appear to be typical of the species.

I have had the gall-wasp emerge in May, June and July of first year, Synergi in July and Chalcids also in July of first year. May and June appear to be the time recorded by other authors for the occurrence of the gall and emergence of the gall-wasp. Adler noted the appearance of the gall in April when conducting his experiments.

T. renum Gir.—The gall of this species appears to be rather local in its occurrence, but is usually fairly plentiful where it does occur; I have found it on *Q. robur* at Limpsfield Chart, Epsom Downs, Bookham Common and Coldharbour; also on *sessiliflora* at Limpsfield Chart. It is rather late in appearing, October being the usual month when it may be found. I have observed the gall in the latter part of September, but these have been mostly very young galls. The insect I have had emerge in December from galls collected in October of the previous year, and in January from galls taken two autumns before; galls opened after being kept three years were found to contain living larvae, but I failed to rear any insects from this series.

Adler had the gall in September and October and the gall-wasp emerged in December of second and in January of third and fourth years, but found it a difficult insect to rear. Continental authors appear to have copied Adler.

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Wallington, Surrey.

TIME OF FLIGHT OF HEMARIS TITYUS (BOMBYLIFORMIS).—In South, **1** : 56 (1939 edition), it is mentioned that the normal flight of this Bee-hawk ends at midday which is equivalent to 2 p.m. of the present summer time. In previous seasons I have noticed that they always begin flying about midday, and this observation was well borne out when I visited a well-known locality in the New Forest on May 18. Though I reached the ground about 12.15 in ideally sunny conditions, no Bee-hawk appeared over its favoured flowers till exactly 1 p.m. Thereafter at intervals during the afternoon up to 4.30 p.m. this insect was quite numerous hovering over various blooms. Mr. J. Turner of Bournemouth and myself were able to net several, nearly all very fresh.—C. G. M. DE WORMS ; Salisbury, May, 1941.

ABERRATION OF CATOCALA NUPTA.—W. A. Moore records the capture of a *Catocala nupta* with yellow hind wings (*Entom.*, 1940, **73** : 259). I do not know of any previous record of this form in England, but P. C. T. Snellen gives a coloured plate of a Dutch specimen (*Tijdskr. v. Ent.*, 1884, **27** : 209, pl. 11, fig. 1). It is probably recessive, like the yellow forms of Arctiidae and Zygaenidae.

There is another rare aberration of *nupta* with the black on the hind wings replaced by pale grey, of which a coloured plate is given by M. Caland in the same journal (1896, **39** : 163, pl. 8, fig. 1). Oudemans gives figures of the rolled-up scales, which are found in all similar aberrations. I do not think this form has been reported yet from the British Isles.—E. A. COCKAYNE ; Tindal House Emergency Hospital, Aylesbury.

DIURNAL FLIGHT OF TAENIOCAMPA CRUDA.—While collecting with a friend in a wood near Oxford on April 5, 1941, I was surprised to find three specimens of *Taeniocampa cruda* feeding actively at low sallows, and several others flying wildly in the bright sunshine, along with *Brephos parthenias* and *notha*. The time was 2.30 to 3.30 p.m. I have not before come across this diurnal flight in *cruda* or any other Taeniocampid.—R. F. BRETHERTON ; Merifield, Cumnor Hill, Oxford, May 18, 1941.

A REVISION OF THE GENUS *ERIONOTA* MABILLE (LEP.: HESP.).

By Brigadier W. H. Evans, C.S.I., C.I.E., D.S.O., F.R.E.S.

Erionota Mabille, 1878 : type *thrax* Linnaeus ; fixed by Watson, 1893.

The genus is sufficiently defined in Evans, *Identification of Indian Butterflies*, 2nd edition, 1932, but an exhaustive examination of the material in the British Museum, including the male genitalia, has shown that a very drastic re-arrangement is needed.

1a (6) Forewing apical spots absent or insignificant and partly non-hyaline.

1b (5) Unf with a more or less well marked pale area over spot in space 3.

1c (3a) Upf apex usually paler, but pale area never sharply defined. Large ; fore wing in ♂ 33 mm. ♂♀ only lower half or two thirds of club white before apiculus except in *E. thrax mindana*.

1 (2) ♂♀ fore wing with apex rounded and termen convex ; vein 1 fore wing markedly shorter than vein 7 hind wing. In other respects exactly similar to *E. thrax*. The genitalia are, however, very different both in respect of the clasp and uncus, but more particularly in the aedeagus, which seen ventrally is nearly as wide as the uncus, whereas in *E. thrax* it is only from ¼ to ⅓ as wide. Hitherto confused with *E. thrax*.

torus nov. : ♂, Sikkim, Kurseong (*R. P. Bretaudeau*, 1894) ; type in B.M. Figured in Distant, *Rhop. Malay.*, pl. xxxiv, fig. 17, as *thrax*.

B.M. has 2 ♂♂ Dehra Dun ; 13 ♂♂, 13 ♀♀ Sikkim ; 14 ♂♂, 5 ♀♀ Assam ; 2 ♂♂, ♀ Tonkin ; 1 ♀ Burma (Tavoy) ; 4 ♂♂, 2 ♀♀ China (Kowloon, Foochow, Hong Kong, Nanning-Kwangsi) ; 15 ♂♂, 3 ♀♀ Malaya (Malacca, Perak).

2 (1) ♂♀ fore wing apex acute and termen straight ; vein 1 fore wing = vein 7 hind wing.

thrax. 3 Subspecies.

(*a*) Fore wing cell spot 5 mm. long in ♂.

thrax Linnaeus, 1767 : Java. Fig. in *Lep. Ind.*

B.M. has ♂, ♀ Sikkim ; 4 ♂♂, 4 ♀♀ Assam ; 7 ♂♂, 2 ♀♀ Burma ; 3 ♂♂, 2 ♀♀ Siam ; ♀ Cambodia ; 9 ♂♂, 7 ♀♀ Malaya ; 9 ♂♂, 9 ♀♀ Sumatra ; 9 ♂♂, 9 ♀♀ Nias ; ♂ Banka ; 12 ♂♂, 12 ♀♀ Java ; 2 ♂♂ Sumbawa ; ♀ Lombok ; 11 ♂♂, 11 ♀♀ Borneo ; ♀ Palawan ; ♀

Billiton ; 7 ♂♂ Philippines (Luzon, Mindoro, Taytai) ; 27 ♂♂, 10 ♀♀ Celebes (Celebes, Sangir, Boongai).

(*b*) Fore wing cell spot 7 mm. long in ♂, outwardly excavate as in *thrax*. Typically with all antennal club white, but variable.

mindana nov. : ♂, Mindanao (*J. Waterstradt*, 1903–4) ; type B.M.

B.M. has 8 ♂♂, 8 ♀♀ Mindanao ; ♂, ♀ Luzon ? ; ♂ Soela ; ♂ W. Samar.

(*c*) Fore wing cell spot 9 mm. long in ♂, outwardly rounded. Upf ♀ and often ♂ with semi-hyaline apical spots. There is a tendency for spot in 2 upf to extend slightly into space 1b.

hasdrubal Fruhstorfer, 1910 : ♂, Batjan ; type B.M. Fig. in Seitz.

B.M. has 28 ♂♂, 9 ♀♀ N. Moluccas (Obi, Batjan, Halmaheira. Ternate).

3a (1c) ♂ upf apex with a sharply marked apical white patch ; entire antennal club white. Wing shape of *E. thrax*.

3 (4) Fore wing spot in 2 overlapping cell spot and much nearer to it, as in *E. thrax*. Smaller, fore wing 30 mm. or less. ♀ only separable from *E. thrax* by its smaller size.

acroleuca. 3 subspecies. Genitalia very variable in clasp, otherwise very similar to *E. thrax*.

(*a*) Fore wing spots nearly white, small. Fore wing 26 mm. in. ♂

acroleuca Wood-Mason and de Nicéville, 1881 (Aug.) ; ♂, Andamans ; type Indian Mus. Fig. *Lep. Ind.*

syn. *hiraca* Moore, 1881 (Sept.) : ♂, Andamans ; type B.M.

syn. *lara* Swinhoe, 1890 : ♂, " Nicobars " ; type B.M.

B.M. has 15 ♂♂ Andamans ; 3 ♂♂ " Nicobars " (*fide* Swinhoe and Moore) ; 2 ♂♂ Kolar, South India (*fide* Swinhoe).

(*b*) Fore wing spots yellow. Very variable in size, as well as in size of spots.

apex Semper, 1892 : ♂, Luzon.

syn. *alexandra* Semper, 1892 : N.W. Luzon. Described by Semper as having spots in 2 and 3 only separated by a vein ; fig. by Seitz, and B.M. has a ♀ from Ticao exactly corresponding.

syn. *apicalis* Evans, 1932 : ♂, Bassein ; type B.M.

B.M. has 2 ♂♂ Sikkim ; 2 ♂♂, ♀ Assam ; 7 ♂♂, 2 ♀♀ Burma ; 2 ♂♂, ♀ Siam ; ♂ Tonkin ; 6 ♂♂ Malaya ; ♂ Nias ; ♂, ♀ Batoe ; ♂ Sumatra ; 5 ♂♂ Java ; 3 ♂♂ Borneo ; ♂ " Celebes " (Swinhoe) ; 10 ♂♂, 2 ♀♀ Philippines.

(*c*) Fore wing spots clear white ; larger than in *acroleuca*. Fore wing 30 mm.

sakita Ribbe, 1890 : E. Celebes.

syn. *toradja* Fruhstorfer, 1911 : ♂, E. Celebes ; type B.M. B.M. has 8 ♂♂ Celebes.

4 (3) Fore wing spot in 2 not overlapping cell spot, centrally situated between the cell spot and spot in 3. Otherwise as in *E. acroleuca apex*. Fore wing 26 mm. in ♂. Genitalia very different from the preceding species and nearer to *E. grandis*.

tribus nov. : ♂, E. Celebes, Tombuga (*ex* Coll. Fruhstorfer) ; type B.M.

B.M. has 4 ♂♂, 2 ♀♀ from Celebes.

5 (1b) Unf with no well marked pale area over the spot in 3. Spots white and arranged as in *E. thrax*. Genitalia considerably different, uncus without the long side horns.

grandis Leech. 2 Subspecies ; genitalia somewhat differing.

(*a*) ♂ upf with strongly marked apical pale area. ♂ antennal club with only bared portion white. Wing shape of *E. torus*. Fore wing 26 mm. in ♂. Upf spots rather small, cell spot 2 mm. long ; apical dot always present in ♂ and often in ♀.

grandis Leech, 1894 : ♂, W. China, Wa-Shan ; type B.M. Fig Leech.

B.M. has 15 ♂♂, 11 ♀♀ W. China (Wa-Shan, Ship-y-Yang, Kwanhsien, Moupin, Tatsienlou, Siaolou, Tien-tsuen, Kong Tcheou).

(*b*) ♂ upf without sharply marked pale area. ♂ antennal club entirely white. Wing shape more rounded, ♂ dorsum noticeably longer than termen. Fore wing 25 mm. in ♂. Upf spots longer, cell spot 4 mm. long ; no apical dot.

alsatia Evans, 1938 : ♂, Likiang, Yunnan ; type Dresden, co-type B.M.

B.M. has 2 ♂♂, ♀ Yunnan (Likiang).

6 (1a) Fore wing with 3 sharply marked apical spots. Spots yellow. Below very conspicuous pale area along end cell hind wing and above space 3 on F. Upf apex as in *E. acroleuca*. Wing shape of *E. thrax*. Fore wing 30 mm. in ♂. ♂ antennae white at base only.

sybirita Hewitson, 1876 : ♀, Singapore ; type B.M. Fig. Distant and Seitz.

B.M. has ♀ Burma (Tavoy) ; ♀ Central Siam ; ♂, 2 ♀♀ Malaya (Perak, Singapore) ; ♂ Borneo.

Note.—The abbreviations are the same as those used in the author's *Identification of Indian Butterflies*, 2nd edition, 1932.

ON REARING LEPIDOPTERA.

By Frank Littlewood.

(Continued from p. 130).

My best results have nearly always been obtained with small, or at any rate reasonable numbers. It is more profitable to rear 50 carefully than to attempt 300 and neglect them. Things may go well for a time, while the larvae are young, but the proper feeding of so many increasingly voracious caterpillars soon becomes a toil, and the net result in healthy pupae and well developed imagines is apt to be disappointing.

Larvae that are accustomed to feed gregariously may, of course, be herded together in bigger numbers than those of a solitary habit. Species such as *E. lanestris*, or *P. bucephala*, are really only happy when sitting on or crawling over one another, and will pine if kept solitary ; but with *D. vinula* or *P. dictaeoides* crowding will quickly lead to irritability and biting. The larvae cross each other's path too often, and their greetings are rarely of a friendly nature. This quarrelsomeness is a very real danger, for a chance bite may lead to a taste for blood and start the cannibalistic habit.

So, generally speaking, active larvae require more room than those of a lethargic habit, and quarrelsome larvae more than those of a peaceful disposition. The Geometrae are, as a rule, well behaved, and stand crowding better than do the soft Noctuids. But Geometers will often clasp each other tightly, as they would a twig, and the under dog will then struggle to free itself and may retaliate with a bite. Some discrimination is therefore necessary. But as an example of what I call safe crowding I may say that a few years ago I reared to full growth in a single $3\frac{1}{4}$ in. glass top tin 25 *M. albicillata*, without a casualty or a check of any description ; and the moths bred out could not have been finer representatives of their kind.

Again, exceptional species such as *T. populeti*, which spin for themselves a succession of domiciles or shelters, by drawing together two leaves or folding over a single leaf, must of necessity have sufficient food-plant per larva to provide both for board and lodging ; and this double requirement has to be taken into consideration when arranging the population of the cage.

The size of the cage for *infant* larvae is, however, limited by the following consideration : Baby larvae are often very restless and wander away from their food, and are apt to lose themselves and starve if their quarters are too roomy. It is impossible therefore at this stage to get over the overcrowding risk by enlarging the

cage. The obvious alternative is to accept small cages but to take care to have plenty of them, so that no one cage holds more than a reasonable number of larvae, and yet larvae and food shall be in the necessary close contact. There is a practical advantage in having plenty of cages at any stage of the brood's life, for in the event of disease or cannibalism breaking out losses may be lighter than if the whole lot had been crowded into one bigger cage.

A small glass top tin, or a closed tumbler-cage ought to hold quite safely 40 larvae in their first stage or 20 in the second. Actually I have made them hold more; nevertheless, if these figures are not exceeded, the rearer may rest assured that whatever trouble may arise later on it is hardly likely to have been caused by early overcrowding.

I have already said that I am firmly of the opinion that one of the more potent influences promoting rapid growth and general well-being in lepidopterous larvae is a regular genial temperature—a very difficult thing to arrange for when we cannot control the elements. For even though they may be reared entirely indoors, captive larvae are influenced by a sudden change of weather. But we can go so far—farther than is possible with broods sleeved in the open. It is quite a fallacy to assume that sleeving, by its nearer approach to nature, is the best possible treatment for all captive larvae. For some it undoubtedly is, but by no means for all. On more than one occasion I have proved that a species such as *A. populi*, which the books recommend the collector to sleeve out, can be fed up more quickly and to bigger proportions indoors in a cage. And it is the common experience of a careful and fortunate breeder to find his larvae, reared indoors under sheltered and quite artificial conditions, develop more rapidly and make bigger specimens than when sleeved in the garden, or even than those wild examples he may catch.

Young larvae, especially, seem susceptible to cold, and a sharp frost in May has been known to kill whole broods which have been exposed in a sleeve. Even full grown larvae of *P. brassicae*—a species that is hardy enough once it attains the pupal stage—cease eating and perish miserably with the advent of severe frost in an early winter. I am of the opinion, too, that a sudden considerable fall of temperature, short of freezing, though it may not prove fatal to the larvae, yet has nevertheless a distinctly injurious effect, giving their vitality a shock and weakening their power of resistance to disease. This applies, I believe, to larvae of all ages.

In our capricious northern climate it is no uncommon thing to have odd nights of quite sharp frosts—even as much as 10 degrees—and bitter Arctic winds during the latter part of April, the whole of May, and occasionally even in early June; and again, by the middle

of August there may frequently be felt a nip in the air which tells that an all too short summer is beginning to wane. Apart from the direct effect of such unseasonable frost on the larvae, it starves the tender foliage and makes it less suitable as food. Thus both ends of the season are to be regarded as possible danger periods for larvae —that is, from the opening of the buds till at least the middle of May, and again from mid August till the fall of the leaf.

A suitable temperature in the breeding house or room is a very desirable condition. But by suitable I do not mean a high temperature—one, rather, that may be described as kindly. The object is not to force the larvae, but to keep them continuously comfortable and active; and never to allow them to feel chilled so that they relapse into a state of lethargy, lose their appetite, and, with suddenly weakened vitality, invite the onslaught of disease.

My view is that, even in a state of nature, the chief elemental danger is unseasonable *cold*, not excess of moisture. Wild larvae can stand a considerable amount of damp providing they are not chilled as well. Conversely it has been argued that they can endure intense cold if only it be dry. That, however, has not been my own experience. In outdoor cages, sheltered from the rain, and in indoor cages where they are protected from even a damp atmosphere, the effect of sudden cold may readily be observed in the sluggish demeanour and failing appetite of the larvae. Comparative tests with different portions of the same brood under varied conditions of temperature have made it quite clear that larvae do appreciate steady genial warmth.

Hibernating larvae obviously fall into a different category. Ability to endure cold, or at least a considerable amount of cold, will no doubt be inherent in their physiology, and would require many generations to breed out. This is Tutt's argument, and I think it is sound. Warmth for them in winter will be just as injurious, because unseasonable, as undue cold for spring and summer larvae. But prolonged severe frost is fatal to many kinds of hibernating larvae; even their general immunity has limits. One thing seems certain: that the removal to a warmer room is the best of all specifics for larvae of any age that are hanging fire and doing badly; and that, on the other hand, it is usually fatal to remove a cage suddenly from a warm room to one much cooler. I once had a very fine brood of *C. elinguaria* which had fed up splendidly in a warm kitchen and were nearly ready for spinning up. The weather was very hot, and, thinking that they might pupate more successfully in a cooler place, I removed the cage to the cellar. Within two days 12 of the larvae died. On restoring the cage to its former position the deaths stopped practically at once, and the rest of the larvae pupated satisfactorily. It was a severe

object lesson that assisted in drawing my attention to this all important question of suitable temperature.

Many larvae, when quite full-fed, alter in colour, the bright tints deteriorating, and just before burying or spinning up they wander restlessly about the cage and void very moist or even fluid frass. Sphingids lave themselves copiously with saliva. *S. ligustri*, after wandering about in an aimless manner for a considerable time, took up a position on the side of the cage and remained there absolutely quiescent for six hours and then quickly buried itself in the peat soil provided. At this period, too, larvae diminish in bulk and, also, in weight.

Larva-Rearing on the "Close" Method.

The essential difference between the close method of larva rearing and the ordinary method is that, whilst in the latter the cage is well ventilated and airy, and the food-plant has its stems immersed in water so that it is kept fresh for a considerable time—at least two days, and often longer—in the former the cage is usually a metal box, to all intents and purposes air-tight, and the food is in the form of fresh-cut pieces, merely laid in, and renewed at short intervals.

As has already been said, the close method is, for a large number of species, a very simple and safe method, and is, for some kinds, undoubtedly the best possible treatment. It calls for a little more care in the matter of cleanliness; frass and food, both of which quickly dry up in an open cage and are thus innocuous, in a close and air-tight cage remain soft and wet, and quickly become mouldy, giving off unsavoury exhalations that are apt to breed disease.

On the other hand, the process of changing the food is more quickly accomplished, so that on the score of labour there is little to choose between the two methods. They are not, however, to be considered as rival methods; each has its own advantages under varying conditions and for different kinds of larvae.

As already stated, the close method is the one usually employed in the case of infant larvae, and is, on the whole, quite satisfactory. The glass-top metal boxes supplied by the dealers and, in addition, the tumbler-cage I have advocated, are the best receptacles for very young larvae, and indeed for limited numbers of larger larvae. But for growing or adult larvae of the larger species something more roomy is, of course, required, and the cage usually takes the form of a biscuit tin, toffee tin, or similar air-tight metal box. There is now an unlimited choice in this pattern of cage, for a variety of tins—unknown to the older collectors—floods the market in ever-increasing quantity So many articles in everyday use are to-day

packed in well-made tins of all sizes and shapes that the larva-rearer has no difficulty in supplying himself with a wide range of cages at little or no cost, and cages well suited to the requirements of the different kinds and sizes of larvae. When one considers the comparative poverty of men like Greene in this respect one cannot be surprised that their instructions to the young collector seem to us so unpractical and out-of-date.

One of the most useful types of tin box, of moderate size, is the 1 lb. flat tobacco tin, a shallow rectangular box of approximately the following dimensions: 7 in. by 4½ in. by 2 in. Another useful tin, somewhat larger, holds Rowntree's gums, and is about 8 in. by 5 in. by 3 in. Still larger, and big enough for anything, are the circular or oval tins used for the packing of various wrapped toffee. Best of all I have found, for the larger larvae, are the fine canisters sold to the schools, containing Horlick's dried milk. This canister is some 10 in. deep and 6 in. wide. It has a lever lid, which I usually discard and replace by a square of glass. Larvae of the largest kinds, e.g. *A. populi*, may be easily and safely reared in such a cage. They hold a lot of food-plant and are readily cleansed.

I make a point of replenishing the food supply *each* day, and of never allowing frass or unused food to accumulate and develop mould. A sprinkling of granulated peat on the floor of the box is a wise sanitary precaution, as it absorbs surplus moisture and wraps up the newly-voided frass, making the cage easier to clean out. The daily attention consists in removing the larvae with brush or spoon to a duplicate clean tin, prepared with peat and fresh food. The old tin is shaken out, wiped clean and allowed to air, and brought into use again next day. From time to time the tins are thoroughly scalded and sterilized.

(To be continued.)

NOTES AND OBSERVATIONS.

NYMPHALIS POLYCHLOROS IN KENT.—It may be of interest to record the appearance of a specimen of *Nymphalis polychloros* in Sevenoaks on May 17, 1941.—WILLIAM E. BUSBRIDGE; "Gresham," Bradbourne Park Road, Sevenoaks.

LARVAE OF CIRRHODIA XERAMPELINA.—Several methods have been suggested for obtaining these larvae, such as finding them under loose bark or moss at the foot of ash trees, or crawling up them at dusk, but that adopted by Mr. C. R. Pitman seems to yield the best results. Wide pieces of sacking are strapped round ash trunks, of roughly a foot in diameter, about 5 ft. from the ground, and after leaving them for several days, they are unhitched and as a rule each piece harbours a number of the larvae. In this way during the first week of May we collected a great many of all sizes. They only

require to be put into a pot filled with damp moss and given an adequate supply of ash twigs. Mr. Pitman bred them 100 per cent. by this means in 1940. The pot should not be disturbed once the larvae have disappeared into the moss for their resting period before pupation.—C. G. M. DE WORMS; Salisbury, May, 1941.

LARVAE OF APAMEA OPHIOGRAMMA.—Though there is a certain amount of information in the literature for obtaining these larvae, there are some recent observations I have made which may be of interest. When searching for signs of their presence in *Phaleris arundinacea*, a very recently withered central leaf should be looked for, not one that is dried up. On slitting the stem the larvae will nearly always be found at the base below the entrance hole, and can be readily distinguished by its brown tint and black head and anal plates from that of *A. secalis* (*oculea*), which also inhabits this reed-like grass, but which is bright green and always much higher up the stem, usually above the hole. Clumps of this grass slightly away from a stream as a rule provide the best hunting-ground during the latter half of May. The cut stems should be placed in a sealed tin with moss at the bottom, so that they do not dry up, especially when the larvae pupate.—C. G. M. DE WORMS; Salisbury, May, 1941.

LITHOPHANE SEMIBRUNNEA.—While in the New Forest on May 18, I was surprised to find a female of this moth on a fence. Though it is well-known that it lays its eggs well on into the spring, sometimes not till early May, this date would seem an abnormally late one, no doubt due to the very unpropitious conditions earlier in the season. The insect will lay readily if placed in a net-covered box with a few sprigs of privet.—C. G. M. DE WORMS; Salisbury, May, 1941.

UNUSUAL PAIRING OF BISTON HIRTARIA.—In the afternoon of May 2 last at Wimbledon I took a small worn male of *Biston hirtaria* paired with a very large female of the species and they remained paired until the afternoon of the following day, when they were forcibly separated. That night a batch of about 300 eggs was laid. On the morning of the 5th the moths were again found paired and remained so until the evening of the 6th, when they separated naturally. Subsequently eggs to the number of about 500 were laid, making about 800, all of which hatched with the exception of 41, which formed part of the last batch laid.—A. A. W. BUCKSTONE; 90, Pams Way, Ewell, Surrey.

CLAVIGER TESTACEUS PREYS. IN CAMBRIDGESHIRE.—Dr. H. E. Hinton has recently (May 25, 1941) taken one specimen of *Claviger testaceus* in a nest of *Acanthomyops* (*Chtonolasius*) *flavus*) and two specimens in a nest of *A.* (*Donisthorpea*) *niger* L. at Linton, Cambs. The only other record I have for this county is Fleam Dyke (Nicholson) (Donisthorpe, "The Zoology of Cambridgeshire," *Victoria History of Cambridgeshire* [1938]).—HORACE DONISTHORPE; Entomological Department, British Museum, May 26, 1941.

DIPTERA IN DUMFRIESSHIRE.—The following Diptera were mostly taken some time ago, but have not been recorded. They were

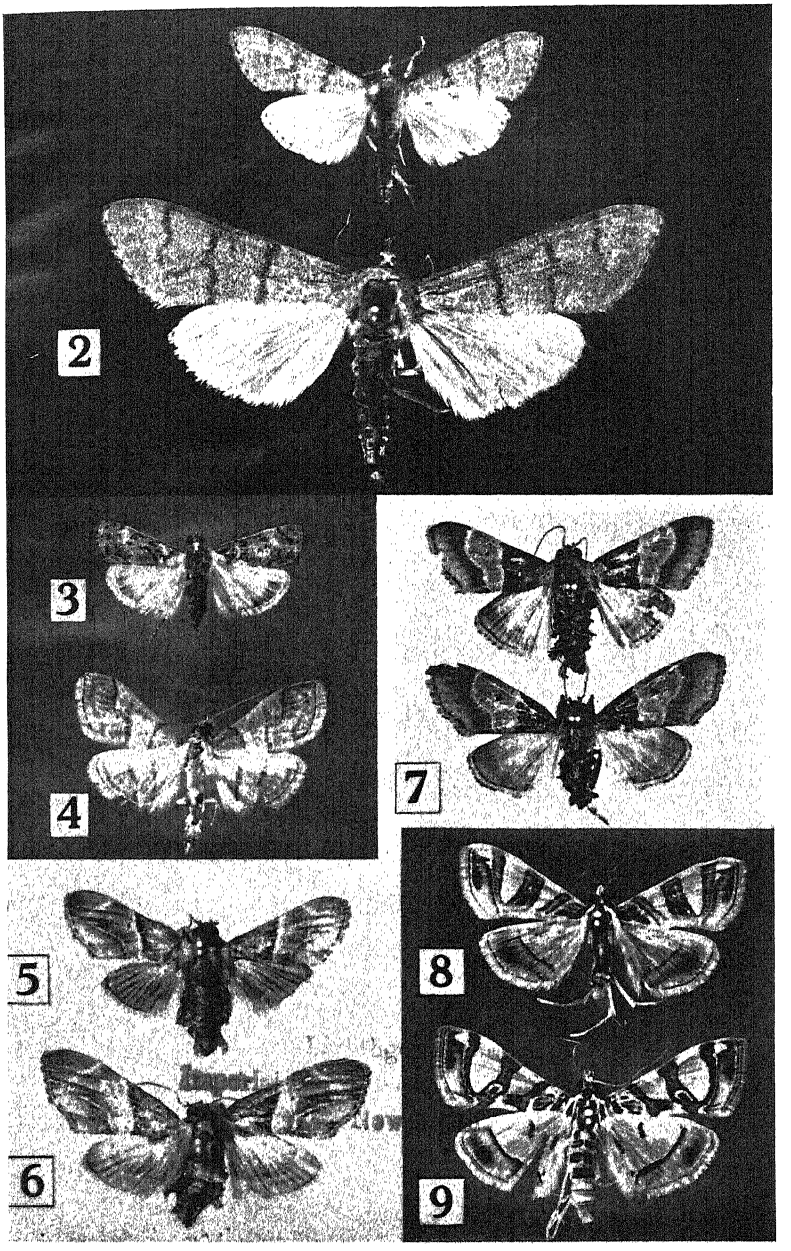
chiefly captured near or in this village. *Palpomyia quadrispinosa* Goet., in woods at Quentin's Hill and elsewhere in June. *Cricotopus flavocinctus* Kieff., swept in a grassy lane near Rigg in May. *Spaniotoma oblidens* Walk., and *S. rhyacobia* Kieff., from a sleeper fence by the railway side at the end of April. This fence harboured many Diptera on its leeward side in spring. *S. dispar* Goet., swept on Newton Moss in May. *Smittia aterrima* Mg., common on Ulex at Springfield in April. *Chironomus notatus* Mg., sweeping roadside herbage in August. *Simulium latipes* Mg. and *S. ornatum* Mg.; both species occur in May by sweeping hedgerows, but are not common. *Swammerdamella brevicornis* Mg., Nutberry Moss in July. Scarce. *Sargus cuprarius* L., common about Springfield in August. It also occurs in my garden. *Beris vallata* Först., common in May and June at flowers. I have taken it on windows in my house. *Leptis lineola* F., generally distributed in July and August. *Rhamphomyia nigripennis* F., not uncommon on waste land in June and July. *Empis verralli* Coll., one specimen in a lane in May. A northern species, although found by Verrall on Snowdon. This was determined by Mr. J. E. Collin. *Hilara flavipes* Mg., several met with in July. Mr. Collin says this is a more southern species. *Dolichopus trivialis* Hal., frequent in moist places on Newton Moss in June. *Campsicnemus curvipes* F., Nutberry Moss in August, common. *Verrallia aucta* Fln., not rare in woods and lanes from May to August. *Pipunculus xanthopus* Thoms., sweeping under trees in August. *Melanastomum ambiguum* Fln., at flowers in May and June, not rare. *Syrphus cinctus* Fln., Nutberry Moss in July. *Lydella stabulans* Mg., not uncommon on the mosses in July and August. *Onesia biseta* Vill., Newton Moss in July. *Exorista nemea* Mg., from the same locality, but in May. *Morellia hortorum* Fln., common in my garden in summer. *M. simplex* Lw., Newton Moss in June, frequent. *Limnia rufifrons* F., in grassy lanes by evening sweeping. Not uncommon from May to August. *Sapromyza difformis* Lw., swept by side of a wood in early June. *Agromyza reptans* Fln., near Springfield, fairly common in July and August. *Chaetoneurophora thoracica* Mg., a female swept August 29, 1938. I have so far failed to meet with it again. Reputed common sometimes in Beech woods.—JAS. MURRAY; 6, Burnside Road, Gretna, Dumfriesshire.

RECENT LITERATURE.

The Amateur Entomologist.—Number 38 of this now well-established journal contains 64 pp. of letterpress, 4 half-tone plates and a large number of text-figures. It costs 4*s.* 6*d.* and includes a deal of matter of more than passing interest. The two articles of outstanding value are those by W. H. T. Tams and E. A. Cockayne, which survey much the same field, but from different aspects. The former reviews the recent additions to the list of British Macrolepidoptera from the view point of the taxonomist, and the latter is concerned with their biology, but both, though recording the advances made, indicate

clearly how great our ignorance remains in many directions. The article by Tams should be of particular benefit to collectors as his numerous line drawings of genitalia are mostly of such a kind as to enable identification to be made with the minimum of dissection, or in some cases without the need of any. Excellent as these figures are, some would have been improved by greater reduction in reproduction. The critical species dealt with belong to the genera *Procus*, *Luperina*, *Hydroecia*, *Heliothus*, *Ortholitha*, *Anaitis*, *Dysstroma*, *Thera*, *Lampropteryx*, *Oporinia* and others, and the plates illustrating the insects are, on the whole, not at all bad. Cockayne deals mainly with the larvae of the same species, and their habits, but also adds here and there brief notes on important diagnostic characters to be found in the wing markings of the imagines. Rather appropriately O'Farelle contributes a summary account of the form and function of the genitalia in Lepidoptera, and outlines dry and wet methods for their examination and preservation. The remainder of the volume is mostly devoted to notes on particular insects and to simple hints on methods of collecting and preservation. A useful issue. N. D. R.

United States Department of Agriculture.—Since entomological publications issuing from this source were last noticed in these columns (1940, *Entom.*, **73** : 168) many more have been received, of which a number are of general interest. In the *Technical Series*, No. 716 (24 pp.), is an account of investigations on the physical and chemical properties of Beeswax; since virgin beeswax is uniform in these respects the bulletin deals chiefly with contamination and methods of clearing and bleaching. No. 723 (44 pp.) is an exhaustive study of the biology of the seed-corn maggot (*Hylemya cilicrura* Rond.). No. 762 (29 pp.) consists of a study of the structure and development of the alimentary canal in *Prodenia eridania* Cramer; although the information was found to conform with what is already well known of other species, this particular species has not been so fully examined before, and the results are being put to use in other work on this crop pest. In the *Miscellaneous Series* several bulletins of taxonomic importance have appeared: No. 354 is a review of the parasitic wasps of the genus *Exenterus* (Ichneumonidae) by Cushman; No. 371 a revision of the North American *Myzus* by Mason; and No. 417 an account of the Bark beetles of the genus *Hylastes* in N. America by Blackman; all three include descriptions of new species. *Circular* No. 554 (64 pp.) is devoted to lists of the honey and pollen plants of the United States, given state by state and illustrating graphically the times of their availability; No. 576 consists of a report on the use of chlorine gas as a seed disinfectant in which the conclusion is reached that it is unsatisfactory except in special cases. Three Farmers' Bulletins deal with the Army worm (*Cirphis unipuncta* Haworth) (No. 1850), culture, diseases and pests of the Box tree (No. 1855), and insect pests of the Peach (No. 1861). Leaflet No. 205 gives a brief account of the Horn-fly (*Haematobix irritans* L.) and its control, and Picture Sheet No. 5 (8vo) figures the Harlequin Bug in colour and summarizes life history and control. N. D. R.



All figures twice nat. size.

New Pyralidae.

W. H. T. Tams, photo.

Adlard & Son, Ltd.

THE ENTOMOLOGIST.

VOL. LXXIV.] SEPTEMBER, 1941. [No. 940

NEW MOTHS OF THE FAMILY PYRALIDAE.

BY W. H. T. TAMS.

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(Plate II.)

AMONGST the material continually being received by the Imperial Institute of Entomology for identification there is always a proportion of specimens belonging to species which are obviously new. Much of the material is of economic importance and is usually accompanied by full data, but sometimes, in spite of the fact that the specimens bear labels indicating the need for immediate identification, there are notable omissions. To take one case, the fine *Polygrammodes* here described; this has been sent twice, if not three times, from the same source, with an urgent request for identification, yet not a single example gives me any information as to the food-plant, though I am tolerably certain that the specimens were bred. In cases where the food-plant is known it seems a pity that the fact cannot be recorded with the original description, even if the plant is only known by the native name.

I am indebted to the Director of the Imperial Institute of Entomology for the opportunity of studying these moths, the types of which he has generously presented to the British Museum (Natural History).

All the figures are twice natural size.

PYRALINAE.

Sacada nicopaea sp. n.

(Plate II, figs. 5, 6.)

♂ and ♀. Pattern as in Figs. 5 and 6, general coloration auburn to bay, base of fore wing rich and velvety; area between post-medial fascia and termen brownish olive. Expanse: ♂ 24 mm., ♀ 28 mm.

Holotype ♂, allotype ♀ and 2 paratype ♀♀. Uganda, Kampala, 3.iv.1930 (H. Hargreaves).

Food-plant: *Bridelia micrantha.*

A number of specimens were sent in 1922 from Ibadan, Nigeria, by A. W. J. Pomeroy.

Sacada albizziae sp. n.

(Plate II, fig. 7, ♂ and ♀.)

♂ and ♀. Pattern as in Fig. 7, general coloration auburn to bay, base of fore wing rich and velvety; area between postmedial fascia and termen shaded with brownish olive. Expanse: ♂ 24 mm., ♀ 26 mm.

Holotype ♂, allotype ♀ and 2 paratype ♂♂. Uganda, Kampala, 29.iv.1936 (H. Hargreaves).

Food-plant: *Albizzia* sp.

PYRAUSTINAE.

Pagyda hargreavesi sp. n.

(Plate II, fig. 4, ♂.)

♂ and ♀. Palpus, head, thorax and abdomen dorsally deep olive buff, sometimes tinged with cinnamon, ventrally glossy white; legs glossy white, slightly degraded with pinkish buff. Fore- and hind-wings pinkish cinnamon to cinnamon, pattern as in Fig. 4; fasciae accentuated with tawny olive with some trace of ochraceous orange; undersides pinkish buff, the fasciae greyish olive. Hind wings more lightly clothed than fore wings. Expanse: ♂ 22 mm., ♀ 26 m.

Holotype ♂. Uganda, Kampala, 2.viii.1934 (H. Hargreaves).
Allotype ♀. Uganda, Kabale, viii.1940 (G. H. E. Hopkins).
Paratypes, 4 ♂♂. Uganda, Kampala, 4.viii.1934 (H. Hargreaves).

Margaronia sycina sp. n.

(Plate II, fig. 8, ♀.)

♀ and ♂. Pattern as in Fig. 8, the palest markings on the wings iridescent white, the medium shades clay colour, the dark lines and spots fuscous to fuscous black. Expanse 28 mm.

Holotype ♀ (10.vii.1936), allotype ♂ (22.xii.1938), paratype ♀ (10.vii.1936) and paratype ♂ (21.xii.1938). All from Kampala, Uganda (H. Hargreaves).

Food-plant: "Kokowe" (*Ficus*). Leaf-roller.

Margaronia argyraspides sp. n.

(Plate II, fig. 9, ♀.)

♀ and ♂. Pattern as in Fig. 9; the palest markings on the wings iridescent white, the medium shades clay colour, the dark lines and spots fuscous to fuscous black; hind wings with a prominent fuscous black discocellular dash; undersides cartridge buff, shaded with

fuscous. Tegulae with a dark medial streak. Expanse: ♀ 28 mm., ♂ 24 mm.

Holotype ♀ and allotype ♂ (11.iv.1936), 2 paratype ♀♀ (29.viii.1935, 8.v.1936). All from Uganda, Kampala (H. Hargreaves).

Polygrammodes johnstoni sp. n.

(Plate II, figs. 1, 2.)

♂. Antenna bipectinate, the vimina (new term: *vimen*, a twig or branch, plural *vimina*, for the individual " pectinations " of a comb) very short, honey yellow. The general coloration of the moth is silvery grey, the hind wings semihyaline white. The grey effect is produced by a fairly dense irroration of fuscous to fuscous black, the result of many of the white scales of the body and fore wings being tipped with fuscous or fuscous black. The disposition of the fasciae is well indicated in the figures. Fringe of both wings chequered with fuscous black at the vein-ends. Underside white, with a slight fuscous bar on the fore-wing discocellulars, with a trace of fuscous black irroration postmedially; fringes as on upperside. Expanse, 26 mm.

♀. Similar, much larger, with serrate antennae. Expanse, 45 mm.

Holotype ♂ and 4 paratype ♂♂. Uganda, Bugoma, 5.viii.1933 (H. B. Johnston).

Allotype ♀ and 2 paratype ♀♀ of similar origin, dated 4.viii (2) and 9.viii.1933 respectively.

Noorda moringae Tams, 1938, Bull. Ent. Res., **29**: 10, fig.

Plate II, fig. 3. This South Indian moth was illustrated by a line drawing accompanying the original description; it has long been confused with a somewhat larger moth, *Noorda blitealis* Walker, of which also the larva feeds on *Moringa*.

EUMENIS SEMELE IN THE ISLE OF ISLAY.—Last Saturday, July 12, I thought I saw a Grayling at Laggan Point at about 8 o'clock in the evening. Laggan Point is a rocky piece of coast about two miles from where I saw *E. semele* last year. To-day, being very hot, I decided to settle the " Grayling " question once and for all. I therefore set out for the sandhills to a point half-way between Laggan Point and last year's locality. I captured two *E. semele* in perfect condition, and I saw two others. I would doubtless have seen more had I had time to go farther. F. W. Frohawk, in his *Complete British Butterflies*, states that this butterfly has not been recorded in the Western Isles.—R. L. WILKS; Duich, Bowmore, Isle of Islay, July 13, 1941.

MISIDENTIFIED GENOTYPES.

By N. D. Riley.

The preparation of the reports on the Generic Names of British Insects, now being published by the Royal Entomological Society of London, is providing an interesting test, on a fairly large scale, of the efficiency of the International Rules of Zoological Nomenclature in their present form. When it is considered that practically all the really knotty problems in entomological nomenclature are the unwitting creation of the early European authors, and concern the European genera, it is satisfactory to find how relatively few are the cases in which it has been necessary, in order to avoid "greater confusion than uniformity," to apply for suspension of the Rules.

As an official of the British Museum (N.H.), in which a good deal of the work on these lists has been and is being done, and in other capacities, I have been privileged to see in MS. most of the reports already published, and to have before me others in various stages of completion. And it is instructive to find that practically the only constantly recurring difficulty now remaining is that which centres around the fixation of genotypes when one or more of the species concerned have been misidentified either by the original author of the genus or by an author who subsequently designated the type species.

This particular difficulty was dealt with at some length in Opinion 65, but so inconclusively as to have left the whole matter in doubt ever since. For this, the unfortunate phrase "it is to be assumed that his determination of the species is correct" is largely to blame, since some authors have taken this to be mandatory, overlooking the necessary implication of the phrase to the effect that if the assumption is proved incorrect the whole argument falls to the ground. That this is the correct interpretation of the phrase is clear if the full and unanimous Opinions published up to that time (not just the summaries) be consulted. Here, notably in Opinions 19 and 46, phrases such as "an identification is to be accepted as correct until shown to be incorrect." an author's "recognition" of a species is "assumed to be correct until proved incorrect" occur not once, but many times over. There seem, in fact, no grounds for maligning the Commission by the suggestion that, by this phrase in Opinion 65, they had any intention of forcing zoologists to accept as correct identifications which are demonstrably false.

Yet to the writer, and to his colleagues, this argument seems in reality quite beside the point. If difficulty and doubt has arisen it has been created by the Commission itself, and notably by Opinion 65, for the Rules themselves are quite unequivocal. The

whole matter is covered by Article 30, which deals with the designation of the type *species* of genera. It is implicit in this article that the types of genera are *species*; if this fundamental fact be borne constantly in mind there should be no difficulty whatever in arriving at the correct solution. It may entail more labour than is involved in the arbitrary practice of accepting *albus* as the generic type of *X-us*, without reference to the identity of either, a practice which, though it may be sound in nomenclature, may equally well be very unsound taxonomy. But inasmuch as we are to assume that an identification is correct, unless proved incorrect, it is seldom that any considerable research will be needed since the cases involving an obviously doubtful identification are relatively few, and will diminish.

The writer will be very grateful for expressions of opinion from taxonomists interested in this question, for he feels that his interpretation of Article 30 of the Rules is the correct one, and that it automatically removes a serious obstacle to nomenclatural progress. He also believes that the opposite course, referred to above as an arbitrary practice, yet adopted by some writers, will be found on ultimate analysis to rest on no more substantial grounds than a misunderstanding of Article 30 or their own convenience, and that should this practice be allowed to grow it cannot fail, because of its inherent falsity, to bring the work of the International Commission on Zoological Nomenclature into disrepute.

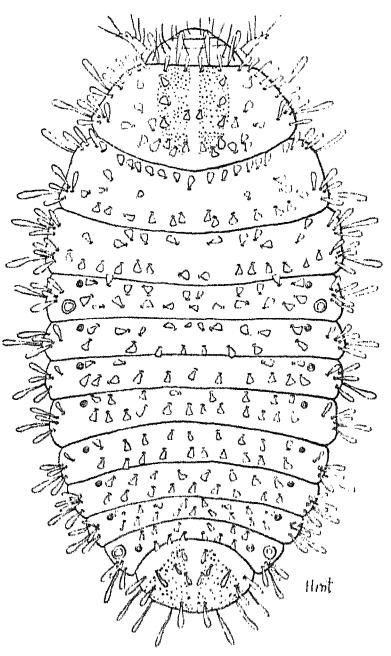
British Museum (N.H.),
London, S.W. 7;
July 26, 1941.

THE FIRST BROOD OF PIERIS NAPI ON THE ISLE OF RHUM.—This year we landed on Rhum on May 26 in as dismal weather as one could conceive. However, next day broke in a blaze of sunshine, and *P. napi* came out in full force. Although we knew that the second brood was attached to *Nasturtium sylvestre* in the Kinloch area, the present brood was concentrated in habitats where the sole suitable food-plant was *Cardamine pratensis*. Thus the insect was found in greater or less abundance throughout Rhum. Half a dozen females were caged for eggs, which were duly obtained, some to hatch on the island and the remainder at Birtley, Co. Durham. The larvae were fed on *Sisymbrium Alliaria* and commenced to pupate on June 21, when the first local brood in Durham began to put in an appearance. I had therefore pupae of the Rhum insect and ova of our local form simultaneously. Although kept artificially cool for experimental purposes, the former commenced to emerge on July 6, and now (July 14) I have ova of the second brood. The earliness of the Rhum season contrasted with our lateness will astonish many readers not familiar with Hebridean conditions in May and June.—Prof. J. W. HESLOP HARRISON; King's College, Newcastle-upon-Tyne.

THE IMMATURE STAGES OF *SERICODERUS LATERALIS* (GYLLENHAL) (1827) (COLEOPTERA, CORYLOPHIDAE).

By H. E. Hinton, Ph.D.
Department of Entomology, British Museum (Natural History).

The egg, larva and pupa of *Sericoderus lateralis* have been described by Heeger (1848), and the larva has been described by Kolbe (1895) and Peyerimhoff (1921). Large numbers of larvae,



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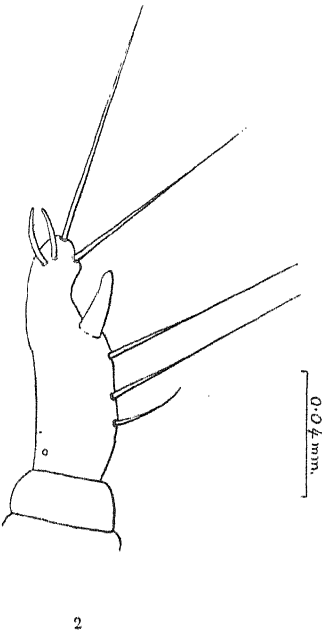

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Figs. 1, 2.—Mature larva of *Sericoderus lateralis* (Gyll.). (1) Dorsal view. (2) Dorsal view of left antenna.

pupae and adults have recently been found by me among mouldy grass cuttings and other mouldy plant refuse. In two days' (4–5.viii.1941) collecting in Linton, Cambs., about 100 larvae, 52 pupae, and 29 adults were taken. Mr. H. Donisthorpe has given me a larva and a pupa of this species found (viii.1941) by him at Heston. The larvae and adults were seen in the field to feed on small fungi; and those kept in the laboratory fed readily on the spores and hyphae of *Mucor Mucedo* L. and the conidia and hyphae of "*Penicillium glaucum*."

The eggs are laid singly on the surface of the hyphae, and the

female makes no attempt to conceal them. According to Heeger (*op. cit.*) the eggs hatch in 9–10 days, the duration of each of the three larval instars is 8–9 days, and the duration of the pupal period is 10–12 days. Larvae kept by me spent one or two days in a resting stage before pupating, and the pupal period lasted 8 days (71° F. ± 1). In the field the larvae pupate among mouldy grass cuttings, etc., and the pupae are attached to the substratum. They have never been found in cracks or crevices or within the

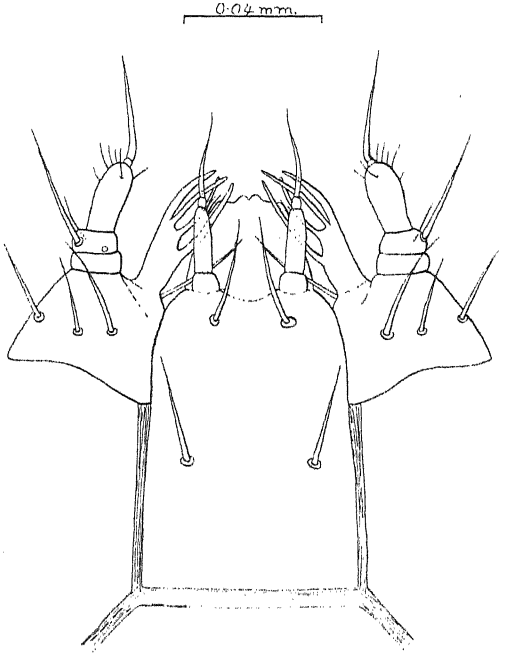

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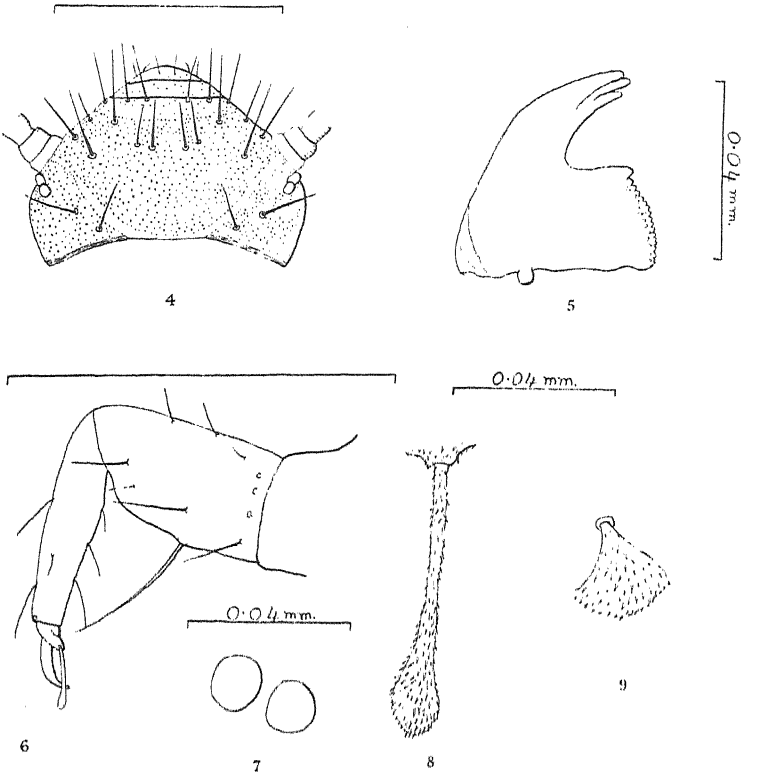
FIG. 3.—Mature larva of *Sericoderus lateralis* (Gyll.). Ventral view of maxilla and labium.

grass stems. The pupae are obtected, the antennae, wings and legs being firmly soldered down to the body by the moulting fluid after the final larval ecdysis. Obtect pupae rarely occur among the Coleoptera. This type of pupa is found, I believe, only in some Coccinellidae and in the Staphylinidae (Staphylininae), all other coleopterous pupae having the wings and legs free from any secondary attachments to the body.

Egg.—Length, 0·33 mm.; breadth, 0·19 mm. Oblong oval with both ends rounded. Cuticle smooth, shining, and white.

Mature larva (Figs. 1–9).—Length 1·8 mm.; breadth, 0·76 mm. Body narrowly elliptical to broadly ovate; dorsal surface feebly

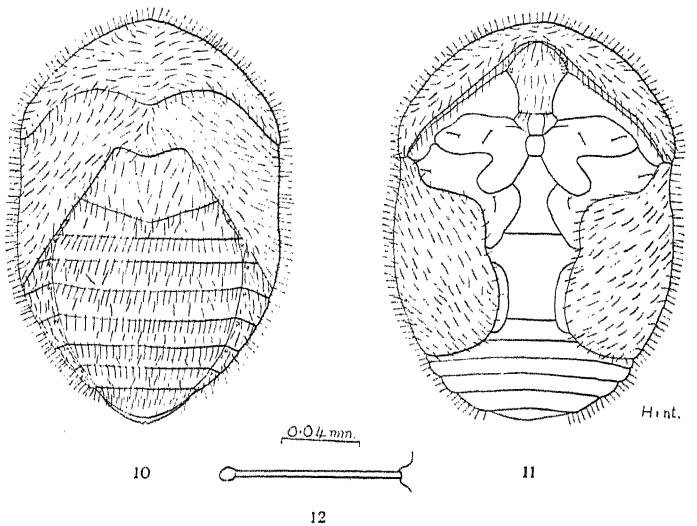
convex and ventral surface nearly flat. Cuticle densely set with acute, microscopic tubercles; colour white to greyish-white; head, a patch on each side of median line of pronotum which is transversely interrupted on caudal third, and a patch on each side of median line of ninth abdominal tergite moderately dark grey. *Head* only partly concealed from above by pronotum or entirely free; setae simple, never fan-like, and distributed as shown in



FIGS. 4–9.—Mature larva of *Sericoderus lateralis* (Gyll.). (4) Dorsal view of head. (5) Ventral view of right mandible. (6) Anterior view of right front leg. (7) Lateral view of ocelli. (8) Seta of lateral margin of pronotum. (9) Seta of middle area of pronotum. Lines next to figures refer to a length of 0·20 mm. unless otherwise indicated.

Fig. 4. On each side with two ocelli (Figs. 4 and 7), each of which has a very strongly convex lens. Antenna (Fig. 2) with only two segments, the third being completely fused to the second. Mandibles (Fig. 5) of both sides similar; each completely sclerotized, with three moderately large and pointed apical teeth, with a large and well-developed mesal mola grinding surface, without a prostheca,

and without setae. Maxilla (Fig. 3) without an externally visible cardo ; palp 3-segmented, two basal segments subequal and third half again as long as combined length of two basal ; mala entire and with five large, stout setae on inner and apical margins. Labium (Fig. 3) with postmentum undivided ; palp 2-segmented with apical segment three times as long as basal. *Tergites* and *pleurites* of thorax and abdomen with broad, flattened setae distributed as shown in Fig. 1 ; setae of lateral margins (Fig. 8) much longer and somewhat more rounded in cross section than those of tergites (Fig. 9). First abdominal segment with a large, dorsal, round, glandular opening on posterior lateral third, the apex of this opening



FIGS. 10–12.—Pupa of *Sericoderus lateralis* (Gyll.). (10) Dorsal view with cuticle of third instar larva removed. (11) Ventral view of same. (12) Enlarged view of a typical seta.

being distinctly raised above the general level of cuticle ; eighth abdominal segment with a similar glandular opening on dorso-lateral side near anterior margin. *Sternites* of thorax and abdomen only sparsely clothed with fine, moderately long, pointed setae. *Spiracles* simple, annular, and opening at level of cuticle ; peritreme moderately feebly sclerotized and entire or broken into 2–5 arcs ; mesothorax with spiracles on antero-ventral side ; first eight abdominal segments with spiracles some distance from sides (Fig. 1) and near anterior margin except on eighth where they are more or less on middle of length of segment. *Legs* all more or less similar in shape and chaetotaxy to front leg (Fig. 6), but with middle pair

longer and hind pair longer than middle legs. Trochanters of all legs completely fused to femora.

Specimens belonging to at least one earlier instar have been examined and they agreed in all particulars with third instar larvae.

Pupa (Figs. 10–12): Length 0·95 mm.; breadth (across third abdominal segment, including elytra), 0·68 mm. Cuticle shining and pale brownish-testaceous; surface very finely, irregularly, and rather densely punctate; setae (Fig. 12) moderately slender, straight, erect, moderately dense, golden-testaceous, and each with a more or less round, apical knob. *Head* completely concealed from above by pronotum; surface with numerous equal setae as described above. Antennae extending caudally and outwards to humeral region of elytra. *Dorsal surface* with shape and setae as shown in Fig. 10. Elytra extend caudally and ventrally to middle of third abdominal sternite; wings are completely concealed by elytra. Abdomen with apical half of eighth tergite and all of ninth tergite without setae; this latter part of dorsal surface as well as apical two sternites clothed with cuticle of third instar larva; pleurites of segments three to seven very large and distinct; pleurite of second segment much smaller and pleurite of first segment scarcely visible. Spiracles of first five segments opening on apices of short but prominent cuticular tubes. *Sternum* (Fig. 11) of mesothorax, metathorax and abdomen without setae. *Legs* with front pair extending to middle of metasternal disc and very widely separated at apex. Middle legs extend to anterior fourth of first abdominal sternite and at apex are as widely separated as front pair. Hind legs extend to posterior third of second abdominal sternite and at apex are only slightly less widely separated than first two pairs.

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Apatura iris near Farnham, Surrey.—It may be of interest to record the capture in this district of a perfect male *A. iris* yesterday on a pat of fresh cow-dung and the sight of another. The day's bag also included *Limenitis camilla* var. *nigrina*, unfortunately not in good condition, which, with the capture of *Euphyia picata*, a moth I have never come across except rarely, sent me home not unsatisfied with the day's work despite the heat.—B. Harold Smith; Casa, Frensham Vale, Lower Bourne, Farnham, Surrey, July 12, 1941.

THE SUPERFICIAL DIFFERENCES BETWEEN *TROIDES CUNEIFERA* OBERTHÜR AND *TROIDES AMPHRYSUS* CRAMER.

By A. G. Gabriel,

British Museum (Natural History).

Oberthür (1879, *Études d'Ent.*, 4 : 110) described *cuneifera* as an aberration of *Troides amphrysus* Cramer, but subsequent authors regarded it as a subspecies until Roepke (1935, *Rhop. Javan.*, 14) drew attention to the considerable differences in genitalia which undoubtedly separate *cuneifera* as a distinct species.

The British Museum (N.H.) now contains more than 50 specimens of *cuneifera* and about 200 of *amphrysus*; it may therefore be of interest to record the superficial differences which will, it is hoped, facilitate identification.

The venation of the hind wing appears to be somewhat variable, specimens of both species differing slightly in the width of the cell compared with its length. I have before me specimens of *cuneifera* and *amphrysus* in which veins 4 and 5 originate from apex of cell, while other examples have these veins originating on either side of cell-apex up to 2 mm. apart.

amphrysus.	*cuneifera.*
Average f.w. length, ♂ 81, ♀ 92 mm.	Average f.w. length, ♂ 68, ♀ 80mm.
Veins of hind wing thinly marked, particularly in the ♂.	Veins of hind wing thickly marked.
Hind wing bright golden-yellow.*	♂. Hind wing golden-yellowish area strongly tinged with green giving a comparatively dull appearance—this applies to the ♀ also in a somewhat lesser degree.
Yellowish-grey streaks on fore wing upperside and underside between the cell and apex of wing usually well defined throughout their length.	Yellowish-grey streaks on fore wing upperside and underside between the cell and apex of wing tending to become obsolete towards wing apex.
Black streak along abdominal margin of hind wing reduced to a thin line which does not reach base of wing.	Black streak along abdominal margin of hind wing broad and extending to base of wing.

* This colour difference is quite striking when a series of each species is compared together.

According to Pendlebury (1936, *Journ. Fed. Malay St. Mus.*, **18** : 178) *cuneifera paeninsulae* Pendlebury, the Malay States subspecies, is distinguished by " the presence of red hair on the

mesosternite " and a single female which I have seen confirms this, but it becomes a variable character in the two other subspecies *cuneifera sumatrana* Hagen and *cuneifera cuneifera* Oberthür, as out of 50 specimens examined the red hair was found in only two, while an examination of 200 males and females of *amphrysus* showed that in only three specimens was the red hair present.

T. cuneifera appears to be confined to the Malay States, Sumatra and Java, in the following races :

(1) *cuneifera paeninsulae* Pend. Malay States at elevations between 1000–4000 ft. according to Pendlebury, *loc. cit.*, 179, where it appears to be uncommon.

(2) *cuneifera sumatrana* Hagen, Sumatra.

(3) *cuneifera cuneifera* Oberth. Java, where according to Roepke, *loc. cit.*, 14, it is not found below about 3000 ft.

T. amphrysus is a well-known butterfly in the Malay States, Sumatra, Nias, Batu Is., Java and Borneo.

I am indebted to my colleague Dr. A. S. Corbet for drawing my attention to some of the above differences.

LIMENITIS CAMILLA AB. NIGRINA.—It may be worth recording that I took a very beautiful aberration of *Limenitis camilla* in a wood in this neighbourhood on Sunday last, July 13. The insect—a female—is very nearly ab. *nigrina*, but there are a few white scales near the outer margins of all four wings. It is in very good condition. The season here seems to have caught up with itself after what must have been one of the slowest starts on record. On the same date (13th) *Aphantopus hyperantus* and *Pyronia tithonus* were both well out—a very early date for the latter in my experience. On the other hand, I was astonished to see a worn female *Leptidea sinapis* still on the wing on July 4. I had entirely failed to observe the first brood on the few occasions on which I had a chance to visit its locality.—P. A. CARDEW (Colonel) ; 105, Rushams Road, Horsham, Sussex, July 19, 1941.

LIMENITIS CAMILLA IN GLOUCESTERSHIRE.—A White Admiral was taken by me to-day as it was feasting on a bramble blossom in a wood on the outskirts of the Forest of Dean. My friend, Mr. T. Bainbrigge Fletcher, tells me that the species has recently occurred in various parts of the Forest, and I note that Mr. Frohawk, in his latest book, says that it has reappeared in many of its old haunts, but it certainly was a pleasant surprise to me, after more than forty years' collecting in this county, suddenly to meet with it for the first time here.—C. GRANVILLE CLUTTERBUCK ; 23, Heathville Road, Gloucester, July 26, 1941.

ON REARING LEPIDOPTERA.

By Frank Littlewood.

(Continued from p. 183).

Resting material is usually put in, but as often as not is never used by the larvae. Knaggs had the idea that larvae suffered from cold feet if they were compelled to rest on a metal or other cold surface. I don't think this can be so, for many of the true hibernators take up position for their long winter rest on the inside of the lid. They apparently take no harm, although they never stir until they begin to feed again. Nevertheless, I usually provide some resting material, of a nature that will not develop mould—shreds of sphagnum moss, dead bracken frond, bits of frayed muslin, short lengths of thin string or cotton. The smaller Geometrid larvae rather like to clasp these things, and, at least, it prevents their crowding together and perhaps annoying one another. But it is as well to avoid dead twigs, grasses, or old food-plant, all of which develop mould rather readily. For the Noctuids, an inch or two of dry granular peat with a covering of really dead oak or beech leaves afford a hiding-place and a protection that seem to be appreciated. Hairy larvae are said to do better in a wooden cage with plenty of moss, but I cannot say I have noticed much difference. My worst failures have been in this group, and I am still left wondering what they do want to keep them happy. It is fairly easy to keep them alive until the early spring, but then, just when they ought to be resuming feeding, they die off in a very disappointing manner. *C. dominula* is an accommodating exception and a good kind for the beginner to try his hand on. I have reared it several times without any difficulty. But *A. villica* and *D. sanio*, treated in exactly the same way, have beaten me again and again. In the first named, when wintered out-of-doors in a cold frame, every larva died in mid-January, following a spell of hard frost (which, curiously enough, did not kill a batch of *C. dominula*). Another brood, wintered in a cold outhouse, lived till March, resting all the time on the muslin cover of the cage. These looked quite hopeful, but instead of coming on to food again they slowly died off. Here, perhaps, is a case where bringing them into a warm room mght have saved their lives. I am inclined to think that these hairy larvae may require somewhat damper conditions during their winter rest than I am giving them. Perhaps some reader may be able to give *me* a tip with regard to this group!

Generally speaking, losses appear to be concentrated at the beginning and at the end of the hibernating period. Those at the beginning may be avoided by taking care to continue feeding as long as the larvae require food. Individuals of a brood may stop

eating by mid-October; others may straggle on till mid-November. Much depends on the season, but care should be taken to keep up the food supply until it is quite clear that the larvae have laid up. This precaution applies, of course, only to the true hibernators. The other group continue to eat sparingly and spasmodically all through the winter, lying torpid only in the coldest spells. These partial hibernators require therefore to have some food at hand all the time, though it may not be necessary to replenish it more than, say, once a week.

The first spring moult, which with the true hibernators appear immediately to precede the resumption of feeding, is a very critical event, and many larvae fail to survive it. Even in what one may consider a successful brood it is almost certain that some will be lost. Rippon's plan of speeding up development by bringing the larvae, in good time, into regular warmer conditions has much to commend it. If only food is available, such gentle forcing may, with some species, be begun as early as the first week of February. I have repeatedly done this with *O. sambucaria* and *A. prunaria*, both of which take privet; and with the *Acidalias*, on dandelion and bramble, in fact with anything that will be satisfied with the few food-plants available so early in the year. If the weather keeps wintry the forcing may be postponed for a week or two longer. But the cages should be glanced at frequently from the end of January onwards, for precocious individuals will waken up in a mild spell following frost, and will quickly die if food is not there to take. Nothing is gained by trying to wake them prematurely, but if any are seen to be moving of their own accord they should be put into another tin and fed on in a warm room.

The partial hibernators can, if compelled by adverse weather, become torpid again and again throughout the winter, awaking unharmed; but the true hibernator, once it has roused up, must go on or die. It is unable to resume its winter sleep.

But all are not precocious; some are veritable sluggards, and when they belatedly rouse themselves are very indifferent about feeding. They usually die before reaching full growth, and are scarcely worth the trouble of rearing. I remember an odd larva of *A. prunaria*, which, though kept, as were the rest of the batch, in a warm room from February onwards, fed in a desultory way until July 15, six weeks after its companions had emerged as moths. I continued to feed it because I was curious to see what it would make, but it died just before spinning up. Useful foods for hibernating larvae include privet, laurel, *Euonymus*, all of which are practically evergreen, and found in every garden; bramble, usually obtainable in sheltered situations all winter; *Myosotis* (Forget me-not), wild strawberry, ivy-leaved toadflax, obtainable all

winter ; groundsel, dandelion, plantain, if weather is not too severe. Some of these plants are worth growing in frames, protected from frost. Lettuce, all winter from the shops ; rose (garden varieties) makes new growth very early in the year and is accepted by some larvae before the hawthorn is available ; hawthorn, quite the best early spring food, obtainable in sheltered places in March ; before then branches placed in water in a warm room will quickly come into leaf ; honeysuckle and wild gooseberry are to be found in the hedgerows very early in the year.

Many hibernating Noctuid larvae will nibble contentedly at sliced turnip, carrot, potato, the first-named being in my opinion much the best food. *A. nebulosa*, for example, will eat turnip, and thrive on it, until the new hawthorn is well in leaf.

Attempts to rear hibernating larvae on a growing plant have, on the whole, not been very successful. It is by no means easy to keep the plant itself healthy if sleeved in a pot, and the tiny larvae are easily overlooked if hiding at the roots of the plant or among the soil and rubbish. A further difficulty is the complete exclusion of predatory vermin ; spiders, centipedes, woodlice, slugs, etc., all like to share the comfort of the sleeve and play havoc with its contents. In the initial stage it is possible to free the plant from such unwanted pests by plunging it overhead in water for half-an-hour. Afterwards it may be stood on an inverted pot, which itself stands in a large saucer of water. With such precautions and the exercise of a good deal of thought and care I have succeeded in hibernating most of the Satyrid larvae on sods of *Poa annua*. If one has the necessary time and patience it makes an interesting experiment.

Removal of Pupae.

As soon as the pupae are formed, and hard enough to bear removal, I take them out of the breeding-cages and pots and deal with them as follows : Species that are due to emerge within a short time (e. g. *T. fimbria*, *O. sambucaria*) are placed immediately in the pupa-cage proper. Kinds that are to lie over winter are packed away in tins and stored in the cellar (see note on winter storage of pupae).

The time that should be allowed to elapse before the pupae are disturbed varies considerably with different species ; but with the bulk of things it is quite safe to empty the pots about a fortnight after the last of the larvae has gone down. Some species (e. g. *A. atropos*) require longer than this ; and the *Xanthias*, *O. lota*, *C. vaccinii*, *H. pennaria* and others, are exceptional and call for special treatment. These larvae spin their cocoons in the early summer —end of May or early June—but continue to lie in the cocoon unchanged for a period of six or seven weeks. With these kinds,

therefore, so soon as the last larva has buried, the pots are tied over with a muslin cover to exclude vermin, and without further damping are stored away in a cool cellar; and are not disturbed until the last week of July, by which time every larva will have completed its change to the pupal state.

The pupating material for all burying larvae being a specially sieved compost of peat and sand, there is no difficulty in finding the cocoons when the pots are emptied, for *every* lump is a cocoon. Some of the cocoons lie free in the soil; others are attached to the under surface of the moss layer, but more frequently to the sides or bottom of the pot or box. When too many larvae have been allowed to bury in a cage, the cocoons will often be found in a dense cluster at the bottom, so massed indeed that it would be an impossibility for the moths to extricate themselves from any but the outermost cocoons.

Such bunches of cocoons are carefully separated, but are not further interfered with, for I hold it to be a golden rule not to open a cocoon if it can be avoided. But it is not always possible to avoid opening cocoons, for in many cases they are attached to the sides or bottom of the cage. These, then, are removed by slipping the point of a small palate knife under the edges, great care being taken not to injure the enclosed pupa. If the cocoon is fairly tough, as it will be if of silk and earth, it will still hold the pupa clean and cosy, and should be allowed to do so.

Some larvae (e.g. *P. pedaria*) make no cocoon, but lie bare in an earthen cavity, which breaks at once when the compost is disturbed, so that the pupae roll out quite free. They are most readily sorted out by passing the compost through a coarse sieve. I usually blow or brush off any particles of soil, and pack the pupae away perfectly clean. A teaspoon is useful for lifting pupae; they should not be picked up with the fingers.

The chrysalids of butterflies, if attached to a portion of the food-plant, have the latter pinned to the side of the pupa-cage. When attached, as they often are, to the top or sides of the breeding-cage in which the larvae have fed up, they are left undisturbed, for it appears to be immaterial to a butterfly whether or not it emerges in a damp atmosphere. Such, at least, has been my own experience. But Stonell (*Entom.*, 1908, p. 182) found it necessary to spray both the larvae and pupae of *E. aurinia*; those kept dry died in the pupal stage. *E. aurinia* haunts damp meadows and may therefore require exceptional treatment.

Special Treatment of Leaf-Cocoons.

The rule previously laid down, namely, to avoid opening a cocoon, must be disregarded when dealing with species such as the

Thorns, which spin up among the leaves of the food-plant. The cocoon in such cases is scarcely worthy of the name, being usually just an open flimsy web or a few strands of tough silk drawing the leaves together; and, unlike a compact earthen cocoon or stouter silken structure, can afford no protection against atmospheric fluctuations.

There is a decided risk in leaving these pupae undisturbed, for the leaves that enclose the web quickly wither and harden, and, contracting, are pretty sure to squeeze the pupa within, and in any case form too hard a barrier for the emerging moth to negotiate. In a state of nature the leaves are still attached to the parent stem, or, if shed, will continue to keep soft through rain and atmospheric moisture; but indoors if damped they very quickly become mildewed.

Therefore, so soon as the pupa is formed and hard, it is taken from its puparium, the latter having been carefully disintegrated with the aid of the fine-pointed scissors, forceps, etc., and the pupa gently lifted with the teaspoon, and placed bare in a "jacket" in the pupa-cage. Or if the pupae are to lie over winter they are placed bare in a small, clean, nearly air-tight metal box, and stored in a cool cellar, pantry, or outhouse (see further note on winter storage).

It is a mistake to open the cocoon of any Dicranurid, and unless the moth breaks out itself it is more likely to go greasy. Grease also seems more readily to attack these moths when they have not been allowed, or made, to evacuate before they are killed.

(To be continued.)

NOTES AND OBSERVATIONS.

LIMENITIS CAMILLA AT MILL HILL.—In a wood near Mill Hill to-day I observed five White Admiral butterflies. The first was in flight in the centre of the wood. The next two were about 20 yards further on, resting on bramble leaves, and in the sunshine. The fourth was still further on, and resting on a bramble leaf. The last was in flight just at the edge of the wood.—HERBERT H. SHORE; 15, Glenloch Road, N.W. 3, July 14, 1941.

LARVAE OF ARGYNNIS AGLAIA NOTED IN RHUM.—I have, of course, reported the Dark Green Fritillary as plentiful on the island. This year, on May 29, I took a full-grown larva as it crossed the path in Kinloch Glen. This pupated a day or two later. A few days after this, at an elevation of nearly a thousand feet in the Monadh Dubh area, another was boxed as it was progressing wildly in the blazing

sun in search of a suitable spot for pupation.—J. W. Heslop Harrison; King's College, Newcastle-upon-Tyne.

An Early Colias croceus.—On June 23 a *C. croceus*, a female, judging by its size, flew very rapidly from west to east across my kitchen garden. So straight and quickly did it fly that I ran round the garden wall to see what it would do. It had apparently gone straight across the adjoining grass paddock without stopping. On June 23 and two previous days the wind was south, barometer falling gradually, with shade temperatures of 80°. On June 25 the B.B.C. announced that bombers proceeding to Germany had encountered heavier thunderstorms and electrical disturbances than ever before met with by the R.A.F. Here, again, a butterfly movement appears to be linked up with meteorological disturbances.—B. Tulloch (Brig.-Gen.); Hill Court, Abergavenny, July 13, 1941.

Honours for Entomologists.—Congratulations to Wm. Mansbridge on the Honorary Degree of M.Sc. conferred upon him by the University of Liverpool on July 5; also to Pte T. G. Howarth, of the British Museum (N.H.), on receiving the medal of the Order of the British Empire "for gallant conduct in carrying out hazardous work in a very brave manner" during an air raid.—Ed.

Hemaris tityus taken in the Isle of Rhum.—Whilst studying the behaviour of queens of *Bombus hortorum* at flowers of sycamores growing along Loch Scresort, I saw what I thought to be a very peculiar *Bombus* sipping honeydew from the leaves. As I approached nearer, I discovered to my surprise that what I was looking at was a *Hemaris tityus*. Since I was without a net I failed to get this example, but later I secured quite a number from Rhododendron flowers in the grounds of Kinloch Castle. One single individual was netted from the Common Daisy—a rather unusual plant. Dr. de Worms, in the July number of this magazine, reports its time of flight as commencing at noon in the New Forest. My note-book reads, "swarming between 10 a.m. and 11 a.m. (G.M.T.); at noon all vanished." This period remained constant for its appearance in maximum numbers throughout our stay, but I did see some along Rhododendron hedges about 2 p.m. (G.M.T.) one hot Sunday afternoon.—J. W. Heslop Harrison; F.R.S.; King's College, Newcastle-upon-Tyne.

A Note on the Breeding of Apatura iris.—On Whit-Sunday, June 1, I had the good fortune to beat in this neighbourhood three small larvae of the Purple Emperor. They were very backward for the time of year, being only ½ in. long. For their breeding I adopted a method which proved very successful in previous years. Each larva was placed singly in a glass-topped tin, about 3 in. deep, with a few sprigs of sallow, which by this method kept fresh for a considerable time. Where a growing bush is not available, this has advantage over placing them on big shoots of cut sallow, which is liable to dry up very quickly. Together with a fourth larva I obtained

a fortnight later, these reached maturity by the end of the month, when I put them out on some large sprigs in a cage for their pupation. The insects duly emerged about the middle of July.—C. G. M. DE WORMS ; Salisbury, August, 1941.

TIME OF APPEARANCE OF ACOSMETIA CALIGINOSA.—Many authors, including South, mention July as the month when this very local little moth appears. When I visited its restricted haunts in Hampshire on June 13, 1938, and June 10, 1939, the insects were for the most part worn. When Capt. R. A. Jackson, R.N., went over to the locality on June 2 this year he found males already out. We went together there on the 8th, when both sexes were well out and mostly in very good condition. We obtained a large number of ova and bred up the larvae on potted plants of *Serratula*. From the above observations, it would seem that this insect in an early season would emerge at the end of May and would be over by the third week in June.—C. G. M. DE WORMS ; Salisbury, August, 1941.

HELIOTHIS PELTIGERA NEAR SALISBURY.—On July 2, while dusking in the garden of Col. Hawley, near here, I took a pale example of this species which, judging by reports of its capture well inland in many parts of the country, must have immigrated in large numbers.—C. G. M. DE WORMS ; Salisbury, August, 1941.

COLIAS CROCEUS IN SCOTLAND.—While waiting for a bus near Gatehouse of Fleet, Galloway, on July 10 I saw a male Clouded Yellow sweep past me coming from the direction of the sea. Though there have been many reports of the insect in the south this year, this is the most northerly record of its penetration I have so far heard of. —C. G. M. DE WORMS ; Salisbury, August, 1941.

DIURNAL FLIGHT OF TAENIOCAMPIDS.—Further to Mr. R. F. Bretherton's note on *Taeniocampa cruda* (*Entom.*, **74** : 157) the following records may be of interest: Single specimens of *Taeniocampa gothica* on April 8, 1939, at 3 p.m., and April 13, 1940, at 3.30 p.m ; the first at dandelion and the second at sallow. On April 21, 1940, between 3.15 p.m. and 4 p.m., I netted three *Taeniocampa cruda* which were very active at sallows. At the same time I found a specimen of *Taeniocampa gothica* at rest on a sallow stem. This year I obtained further evidence that diurnal flight may not be infrequent, when on April 19 I found several *Taeniocampa cruda* flying with *Brephos parthenias* and feeding at sallows. I also took two *Taeniocampa gothica* which were making short flights from bush to bush. All observations were made in Ashdown Forest, Sussex.—N. W. J. CARTER ; East Grinstead, July, 1941.

CALLIMORPHA JACOBAEAE (CINNABAR) ON SENECIO VULGARIS (COMMON GROUNDSEL).—When weeding onions in my allotment I saw a fine nearly full-fed larva on a plant of groundsel which I had just pulled out and thrown down. I thought before that groundsel

was the local food-plant because I have always seen *jacobaeae* in gardens and allotments here at Upton, Notts, and never on the ragwort, although there are a few plants of ragwort here.—A. S. B. F. P. WYNNE; Upton House, Upton, near Newark, Notts.

DIAPHORA MENDICA (THE MUSLIN) IN NOTTS.—I took a smoke grey variety of the above, something like fig. 7 of plate 78 in South's *Moths*, but the black markings more normal, at rest on my beehive here at Upton, on May 20th last. It is never a common moth here in the Midlands. I took an odd specimen at Allington near Grantham in Lincolnshire, but that was the normal type.—A. S. B. F. P. WYNNE; Upton House, Upton, near Newark, Notts.

FUMEA INTERMEDIELLA BRD. ON RHUM.—As I was examining a colony of the sedge *Carex distans* near the Bagh na h-Uamha, I was greatly surprised to find cases of this species both on the sedge and on the grasses with which they grew. This makes the third island upon which this curious insect has been detected. We took it freely on the Isle of South Rona near the cave, but only rarely in a ravine on Raasay.—J. W. HESLOP HARRISON; King's College, Newcastle-upon-Tyne.

SCYTHROPIA CRATAEGELLA L. PARASITIZED BY ANGITIA EXAREOLATA RATZEBURG.—About the middle of June a number of shrubs of *Cotoneaster horizontalis* in my neighbour's garden were so completely enshrouded with the webs of *Scythropia crataegella* that they appeared to be dead. They were stripped of leaves, those few left outside the webs being attacked by numbers of *Biston hirtaria* larvae. The *Scythropia* larvae were at this time mostly full fed, there were numerous pupae in the webs and a small number of freshly emerged moths, but I could find no trace of parasites of any kind. However, on searching some other shrubs of *C. horizontalis* in my own garden, which at first sight appeared quite free of the *Scythropia*, a few webs were discovered, and in them alongside the pupae were some small white cocoons from which ichneumons emerged in the first week of July. Mr. G. E. J. Nixon has identified these as *Angitia exareolata* Ratz., which he thinks has not been recorded from this host hitherto. *Scythropia crataegella* seems first to have been reported on *C. horizontalis* by Mr. Fox Wilson at Wisley in 1929, who noted no parasitism. Several other lepidopterous pests of this shrub have also been recorded by Stringer (*Entom.*, **69**: 144) and Edelsten (*Proc. R. Ent. Soc. London*, **13**: 97).—N. D. RILEY; 7, McKay Road, Wimbledon.

DATES OF APPEARANCE OF CERTAIN DRAGONFLIES ON RHUM, WITH A RECORD OF A SPECIES NEW TO THE HEBRIDES.—As is usual, *Libellula quadrimaculata* was the earliest of these to appear, for we took it on May 28th. *Pyrrhosoma nymphula* came next on the wing a day or two later, whilst *Orthetrum coerulescens*, a species new to my island lists, was netted between the Abhainn Rangoil and Loch

Fiachanis, just under Ruinsival, on June 1.—J. W. Heslop Harrison; King's College, Newcastle-upon-Tyne.

Dragonfly Caught by Drosera longifolia.—On June 25 at Ockham Common I found a small blue dragonfly firmly held by three leaves of *Drosera longifolia*. Darwin mentions a case of a "large dragonfly" caught by two leaves of the larger *Drosera rotundifolia*, but I think that the capture of so large an insect by so small a plant is worth recording. It was mainly held by the body, but the wings were slightly held also by the two other leaves. It flew away on being released, but the bending over of the glandular hairs showed that it had not just been captured.—C. J. Paton; 7, Cavendish Road, Sutton, Surrey.

Lucanus cervus Chased by Sparrow.—One of my brothers tells me that at 3 p.m. to-day he saw a stag beetle flying in bright sunshine—an unusual time—and that it was chased by a sparrow. The latter made a dash at the beetle, which was either hit or swerved, as it changed its course. It disappeared into a horse chestnut followed by the sparrow.—C. J. Paton; 7, Cavendish Road, Sutton, Surrey, July 14, 1941.

Curious Behaviour on the Part of a Queen Bombus smithianus White.—Near the woodland just west of Rudha na Roinne, Rhum, I noticed two queen humble bees, one *B. smithianus* and the other *B. hortorum*, prospecting over a grassy knoll in search of suitable nesting sites. Suddenly the *smithianus* queen pounced upon the *hortorum*, knocking it amongst the grass. It then flew away itself.—J. W. Heslop Harrison; King's College, Newcastle-upon-Tyne.

A Stagbeetle Battle.—The following notes, which I copy verbatim from my description written at the time, may be of interest to coleopterists:

"[1932] June 29; about 9 p.m. (i.e. 8 sun-time). End of lawn. A large stagbeetle ♂ pairing with ♀. A smaller ♂ approached and was at once attacked by the big ♂, which seized it just below the thorax. A few moments later, the big fellow having released the small one, the latter again approached the ♀ and seized her, holding her up in the air. The big one next attacked the small one again, holding him (still holding the ♀) up in the air. Later the ♀ escaped, and the two ♂♂ continued the fight, in which for a time a third ♂ joined. By this time 6 ♂♂ had appeared, and two were fighting a private duel a foot or two away from the main engagement. More ♂♂ arrived and a second duel took place, but so long as I watched the remainder of the males (which ultimately numbered 10 [in all]) did not interfere nor fight among themselves. At the end the largest ♂, which had very good 'horns,' seemed to be the victor, though the ♀ had a hole pierced through an elytron which I do not think was there at the beginning. . . ."

"[June] 30th. . . . A ♂ stagbeetle with one of the elytra

pierced, probably one of the combatants of last evening. The ♀ was still near where I saw her last night, and there were two or three ♂♂ still about the spot. There was a small ♀ in another part of the garden."

I don't think that these battles are often seen. Mr. F. W. Frohawk, whom I called to see it whilst the fight was in progress, said that he had never seen one before. From the manner in which the ♂♂ often fly round the lime-trees in this road, I should guess that the mating commonly takes place amongst the branches.—C. J. PATON; 7, Cavendish Road, Sutton, Surrey.

THE POLLINATION OF THE CUSHION PINK (SILENE ACAULIS).—This fine alpine plant made a brave display of blossoms on the Rhum mountains in May, and we inspected it to determine what insects were responsible for its pollination at high elevations. On the summit of Askival (2659 ft.) queens of *Bombus hortorum* were observed flitting from flower to flower.—J. W. HESLOP HARRISON, F.R.S.; King's College, Newcastle-upon-Tyne.

A SWARM OF ♂ ICHNEUMONIDAE.—On June 29, about 2.30 p.m., G.M.T., I observed large numbers of a species of Ichneumonidae running over the turf near the summit of Coniston Old Man (over 2600 ft.). In numbers and in their movements they resembled a swarm of flying ants, such as one often sees early in August. I took some specimens, which have been identified for me by Dr. K. G. Blair and Mr. G. J. Nixon as *Cratichneumon annulator* F., all males. Morley (*Ich.*, 1 : 63) says " it occurs everywhere, from May to August. Abroad it has been bred from *Macaria liturata* and (? *Fidonia*) *piniaria*, and from *Noctua piniperda*." These are all pine feeders, and he makes no mention of the swarming habits of the males of the species of Ichneumonidae. Similar habits have been noted by Dr. Blair in two other species, *Lissonota errabunda* (Pimplinae) and *Perispudus facialis* (Tryphoninae) (*Proc. S. Lond. Ent. Nat. Hist. Soc.*, 1928 : 65, 1930 : 30, 50, 78, 79). I have no evidence concerning the host of *C. annnulator* on Coniston; there are certainly no pine tree anywhere near, but Dr. Blair has suggested that the host might possibly be *Characas graminis*.—D. E. KIMMINS; Dept. of Entomology, British Museum (Nat. Hist.).

DIPTERA IN DUMFRIESSHIRE.—Last year was a good one for insects generally in this district, and some interesting Diptera were met with. The determination of most of the following I owe to the kindness of Mr. J. E. Collin: *Chironomus pictulus* Mg., one swept from roadside herbage on May 9. *Callimyia elegans* Mg., I swept a female of this rare species near Springfield in August. It may be known by the silvery bands on the abdomen being divided into spots. Introduced as British by Verrall in the *E.M.M.* for 1912. *Chilosia vernalis* Fln., swept from flowers on a railway bank near Gretna in

August. *Baccha elongata* Fab., one in a lane on June 11. *Eumerus strigatus* Fln., scarce at flowers in lanes, etc., in August. *Pegohylemyia* (*Phorbia*) *discreta* Mg., sweeping railway bank in August. *Homalomyia* (*Fannia*) *serena* Fln., common in July and August in grassy places. *Acanthiptera inanis* Fln., one netted in a rough lane in July. This fly lays its eggs in wasps' nests. It is widely distributed but not common. *Coenosia geniculata* Fln., an uncommon species, generally met with in lanes among bramble, etc., in August. *C. rufipalpis* Mg., common in many places from June to August. It has occurred on windows in my home. *Sciomyza pallidiventris* Fln., not uncommon in July. *Minettia* (*Sapromyza*) *fasciata* Fln., scarce; swept in a shady lane in July. *Sapromyza* (*Lycia*) *quadrivittata* Lw., rare; one beaten from Ulex on Nutberry Moss in June. A greyish fly with four brown stripes on the thorax. *Henicita annulipes* Mg., somewhat scarce; odd examples met with in woods and shady lanes in June. The white marked mid tarsi are striking. *Lauxania cylindricornis* Fab., one swept from rough ground near the Solway shore at Browhouses. This fly has yellow wings with a black mark at base. *Centor myopinus* Lw., the var. *monticola* occurs with the type in June. *Chlorops speciosa* Mg., common in summer in woods and lanes. *Tetanura pallidiventris* Fln., occasionally in June and July. *Trimerina madizans* Fln., swept in some numbers in September in a grassy hollow on Nutberry Moss which in winter is frequently a pond.—Jas. Murray; 6, Burnside Road, Gretna, Dumfriesshire.

First Occurrence of Diurnal Lepidoptera up to the End of June.—In an exceptionally late year such as the present it is of more than usual interest to record the first occurrences of Lepidoptera, and in fact of all insects. The following list of records up to the end of June contains all the Diurnal Lepidoptera observed. In addition to these a number of nocturnal species were seen, but as no night collecting was attempted the only records included are of insects which were found by day and were obviously freshly emerged. All insects mentioned were seen at Ash Vale on the Hampshire-Surrey border.

April 4: *Nymphalis io* Linn.
,, 15: *Gonepteryx rhamni* Linn.
,, 17: *Aglais urticae* Linn., *Pieris rapae* Linn.
May 4: *Pieris napi* Linn.
,, 11: *Saturnia pavonia* Linn.
,, 16: *Celastrina argiolus* Linn., *Ematurga atomaria* Linn.
,, 21: *Pyrgus malvae* Linn; females of *G. rhamni* Linn. observed ovipositing.
,, 28: *Anthocharis cardamines* Linn., *Pieris brassicae* Linn.
June 4: *Argynnis euphrosyne* Linn., *Macrothylacia rubi* Linn.
,, 5: *Panolis griseo-variegata* Panz., newly emerged and drying its wings.
,, 7: *Lycaena phlaeas* Linn., *Coenonympha pamphilus* Linn., *Tephrosia punctularia* Hb.

June 8: *Pararge megera* Linn.; *Mamestra trifolii* Rott., newly emerged, drying its wings; *Bupalus piniaria* Linn.; *Anarta myrtilli* Linn.
,, 10: *Anartis plagiata* Linn.
,, 14: *Erynnis tages* Linn.
,, 17: *Polyommatus icarus* Rott.
,, 20: *Diaphora mendica* Clerck.
,, 22: *Ochlodes venata* Bremer and Grey.
,, 23: *Euclidia mi* Clerck, *Plusia gamma* Linn., *Perconia strigillaria* Hb., *Ino statices* Linn.
,, 24: *Colias croceus* Fourcroy.
,, 27: *Vanessa atalanta* Linn., *Diacrisia sanio*, *Cabera pusaria* Linn.
,, 29: *Maniola jurtina* Linn.

ERIC W. CLASSEY; "Greencroft," Heath Vale Bridge Road, Ash Vale, Surrey.

SOCIETIES.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*June* 12, 1941.—The President in the Chair.—It was announced that the late Miss M. E. Fountaine, a member for many years, had bequeathed £100 to the Funds of the Society.—Mr. A. Bliss exhibited a larva thought to be that of an Argynnid; Mr. S. R. Ashby, the "Soldier's Cap" beetle, *Calacanthus incarnatus*, from Ceylon, and the "Domino" beetle, *Anthia sexguttata* Ho., from India; Mr. F. T. Coulson, a number of "garden insects" of several Orders; Mr. Finnigan, larvae of *Argynnis cydippe*; Mr. E. E. Syms, the four British species of Earwig, and read notes on them; Mr. J. A. Stephens, rare and local species of Coleoptera from Chatham—*Epipolaeus caliginosus*, *Liparus coronatus*, *Amara eurynota* and *Paragaeus bipustulatus*; Mr. Steel, species of Coleoptera from his garden. Mr. Eagles read a paper on The Onion-Fly, *Hylemyia antiqua* Mg.

July 10, 1941.—The President in the Chair.—Mr. T. R. Eagles exhibited the large Continental Longicorn beetle, *Morimus funereus*, found in a nursery at Enfield; Mr. Hy. J. Turner, three species of the very brilliant Pierid genus *Delias* of the Indo-Malay Region—*D. eumolpe* from Borneo, *D. zebuda* from Amboina, and *D. isse* from the Moluccas; and Mr. F. D. Coote, ova and larvae of *Callophrys rubi* L., from Horsley. Mr. Coulson read a paper on the Coleoptera of Bookham and exhibited a large number of the species he mentioned. —HY. J. TURNER (*Hon. Editor of Proceedings*).

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THE GENITALIA OF *MNESIPATRIS FILICIVORA* MEYR. AND *TEICHOBIA VERHUELLELLA* STT.

BY BRIAN P. BEIRNE, PH.D., F.R.E.S., F.L.S.

THE systematic position of *Mnesipatris filicivora* Meyrick has been a matter of some doubt. Meyrick, who described the species (*Entom.*, **70** : 194), placed *Mnesipatris* in the Lamproniidae near *Phyllopora* and *Incurvaria*. The food-plants and feeding habits of the larvae are very similar to those of *Teichobia verhuellella* Stainton, which Meyrick (Revised Handbook, 1928) places in the Tineidae. Mr. F. N. Pierce would place *filicivora* in the genus *Teichobia* from a study of the genitalia (see Beirne, *Entom.*, **71** : 255). The larvae of both species feed on the fructifications of ferns, a rather unusual food-plant for Lepidoptera, that of *verhuellella* feeding more or less externally on the leaves and apparently preferring *Scolopendrium*, while that of *filicivora* burrows in the leaves and prefers *Aspidium*. In a recent paper (*Entom.*, **74** : 63) Mr. A. E. Wright compared the larvae and feeding habits of the two species, and expressed the opinion that *filicivora* was correctly placed in the Lamproniidae and does not belong with *verhuellella* ; Mr. Wright was kind enough to send me some *verhuellella* larvae and I had the opportunity of verifying his observations. With his conclusions, however, I do not entirely agree ; while the larvae of the two species may be of different forms and have minor differences in their feeding habits, the fact of their both feeding in a similar manner on the fructifications of ferns and, more importantly, the fact that the genitalia show close relationship to each other points to their being related. The genitalia of the two species are highly specialized in both sexes, but particularly in the male, and as they show no fundamental differences in structure it is difficult to believe that they are not closely related. Furthermore, while the males show no relationship to any other genus of the British Tineina, the females show affinity to the Lamproniidae rather than to the Tineidae. Incidentally Pierce and Metcalfe, in *The Genitalia of the British Tineina*, p. 101, under the description of *Teichobia* have : " This genus is so near to the species included in *Acedes* (i.e. *ganomella* (*lapella*), *semifulvella* and *piercella*) that a separate genus seems unnecessary." Mr. Pierce informs me that this is, of course, an error, and the above remarks should not refer to *Teichobia*, which does not show the

slightest relationship to *Acedes*; it is not clear to what genus the remarks actually apply.

The following are descriptions of the genitalia of the two species (Fig. 1). As the valvae are attached to each other along the

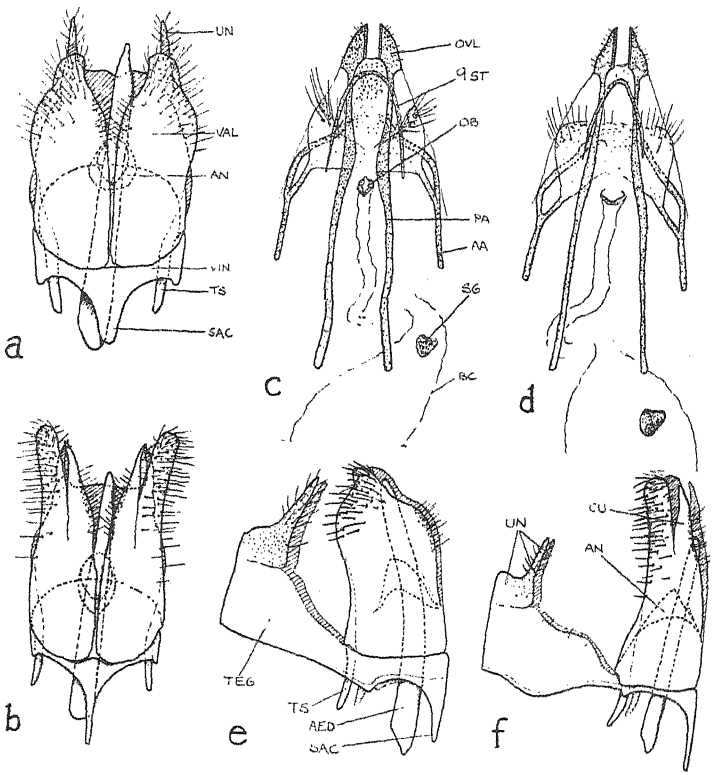

FIG. 1.—*a*, Male genitalia of *Teichobia verhuellella*, ventral view. *b*, Do. of *Mnesipatris filicivora*. *c*, Female genitalia of *T. verhuellella*, ventral view. *d*, Do. of *M. filicivora*. *e*, Male genitalia of *T. verhuellella*, lateral view. *f*, Do. of *M. filicivora*. AA, Anterior apophyses; AED, aedoeagus; AN, anellus; BC, bursa copulatrix; OB, ostium bursae; PA, posterior apophyses; SAC, saccus; ST, sternum; TEG, tegumen (9th tergum); TS, transtilla; UN, uncus; VAL, valva; VIN, vinculum.

basal parts of the sacculi it is not possible to open them out without distortion or injury to the genitalia; in the figures, therefore, they are shown in the ordinary closed position.

Teichobia verhuellella Stainton.—♂: Uncus double, produced as a tapering and pointed arm at either side; closely covered with very short, fine bristles in addition to the usual setae. Tegumen

broad, but not well sclerotized. Saccus rather long, narrow. Valvae stout and bluntly pointed, attached to each other along the basal parts of their sacculi; each with a well-developed transtilla. Anellus cone-shaped, sclerotized. Aedoeagus simple and cylindrical; no apparent cornuti.

♀: Ovipositor lobes strongly sclerotized and with the ventral edges adapted for cutting. Posterior apophyses well sclerotized and very long, each somewhat expanded and flattened before middle. Ninth sternum sclerotized, in the shape of an inverted U. Anterior apophyses well sclerotized. Eighth sternum feebly sclerotized and with its posterior edge adorned with long setae; the eighth tergum not well sclerotized and difficult to make out. Ostium small and rounded, its edges thickened; ductus bursae long and narrow; bursa copulatrix elliptical, with a single signum which is in the form of an irregularly rounded, finely scobinate patch.

Pierce and Metcalf (*loc. cit.*, pl. 61) figure the female of this species as having two signa, but only one was visible in each of the two specimens which I examined. The sclerotized ninth sternum in the female is rather unusual in Lepidoptera generally.

Mnesipatris filicivora Meyrick.—♂: In structure the genitalia are practically identical with *T. verhuellella* and the above description applies equally well here. There is, however, one important difference which may be a generic character, and that is that in *filicivora* the sacculus is extended free from the remainder of the valva as a strongly sclerotized, tapering and pointed arm (the cuiller). Otherwise, except for minor differences in the shape and relative sizes of the various structures, which are apparent from the figures, the genitalia of the two species are alike.

♀: In this sex also the genitalia are practically identical in structure with *T. verhuellella*, the only important difference being in the shape of the signum, which in this species is in the form of a bluntly pointed cone arising from the outer wall of the bursa and usually situated near its middle and not in the neighbourhood of the end of the ductus as in *verhuellella*.

As stated above, the male genitalia of the two species do not show relationship to any other British species; they are apparently distinct from the Lamproniidae, which form a fairly homogeneous group in respect of the male genitalia, one of the most characteristic features being the very large saccus, and are certainly distinct from any of the Tineidae. The female genitalia show some relationship to the Lamproniidae but none to the Tineidae, but of course this relationship may be only apparent, as the female genitalia in Lepidoptera are chiefly modified in connection with egg-laying and not with copulation, and similar habits may have produced similar

specializations in the genitalia; in itself the fact that the Lamproniidae and *filicivora* and *verhuellella* have similar egg-laying habits may be significant. The well-developed apophyses, indicating well-developed muscles, in the two species under discussion, as well as the cutting edges to the ovipositor lobes, indicate that the eggs are laid in slits cut in the leaves of the food-plant. The Lamproniidae also have the ovipositor lobes adapted for cutting and well-developed apophyses and are known to lay their eggs in slits cut in the leaves. On the other hand the ovipositor lobes of the Tineidae are of the ordinary, soft, membranous type and the apophyses are not well developed.

The similarities in the structure of the genitalia as well as in the life-histories indicate that *filicivora* is definitely related to *verhuellella*, but I do not agree with Mr. Pierce that they are congeneric; there are too many other differences in structure for this. But they are apparently more closely related to each other than either is to any other British species and, in my opinion, belong near the Lamproniidae rather than in the Tineidae. It would be interesting to see if the genitalia of the one other described species of *Mnesipatris*, *M. phaedospora* Meyrick, conform with the *filicivora* type.

4, Tobernea Terrace,
Monkstown,
Co. Dublin;
July 15, 1941.

DANAUS PLEXIPPUS IN CORNWALL.—On August 30, 1941, I captured a specimen of *Danaus plexippus* at Kynance on the Lizard, South Cornwall. I first saw it when a short distance below the summit of the path leading up from the cove, at approximately 6.20 p.m. (British summer time). It was then flying slowly about 8 ft. from the ground towards a rocky hillock. On nearing the top it turned down into a hollow and hovered a few inches above the ground. It flew forwards and upwards again as I approached, so that it was easy to catch it on the wing. The specimen is a female in almost perfect condition. It is reasonable to suggest that it may have reached Falmouth, fifteen miles away, in a boat from America. —E. B. FORD; University Museum, Oxford.

COLIAS CROCEUS IN HANTS.—I took a fresh male *Colias croceus* in a lane here to-day, the first I have seen this year.—(Capt.) ALBAN F. L. BACON; The Malt House, Burghclere, North Hants, August 21 1941.

[This species was seen in some numbers between September 6 and 13, at Selsey, West Sussex, several being noticed apparently flying in from the sea.—N. D. RILEY.]

NOTES ON SOME GALL-CAUSING *CECIDOMYIDAE*: I.

By M. Nibletт.

The following notes on Cecidomyid galls and insects bred from them are a record of observations made by me on a number of species during the past few years. I have adopted the method used by many cecidologists as a means of identification, i.e. taking the form of the gall, the colour of the larvae, and the host-plant. This appears to be a fairly satisfactory means of identifying those species which have been described, but considerable care is necessary to avoid mistakes, particularly where the colour of the larvae is taken into account, as in some species this changes during development; also it is very essential that a careful examination of the galls should be made so that larvae of species other than those of the gall midge may be separated from these. If these precautions are taken the results may be considered reliable.

It will be found that various authorities have different ideas of colour; this is rather a snag at times as it is apt to mislead one, but colour names are always difficult to interpret whether applied to midge larvae, postage stamps or heated steel, no two persons apparently seeing colours with the same eye.

There are numerous variations to be found in the generic names and also in some of the specific names as used in this country, in America, and upon the Continent; far more work appears to have been done abroad in recent years in connection with these insects than by British dipterists. I have used the names that appear to be in general use upon the Continent, putting in brackets those by which they are known in this country, where they vary.

I have found at one time or another many species of Cecidomyid galls, but propose referring mainly to those of which I have successfully reared the gall midges. Unless otherwise stated localities given are from the county of Surrey.

Some species offer no difficulty, but others I have failed to rear although numbers of galls were collected year after year. I have been unable to assign any definite reason for these persistent failures. Parasites are of course to a certain extent partly responsible but the answer is not with these entirely; moisture is essential for the development of the midge larvae and this brings other troubles in its train. I have had a good yield from galls that have been kept very definitely on the dry side and also from others which had been reduced to a mass of soggy pulp. A knowledge as to whether the larvae pupate in the gall or in the earth is often helpful.

Lasioptera carophila F. Loew.—Galls of this species occur upon

the flower-heads of various species of Umbelliferae, causing considerable swellings which are inhabited by the orange red larvae; these, as far as I have been able to ascertain, pupate in the gall. I have failed to rear this midge, the majority of the galls that I have kept yielding Chalcids only, these emerging in some numbers in April and May of the second year.

I have found the galls on *Pimpinella saxifraga* L. at Oxshott, Croham Hurst, Banstead Downs and Dorking; on *Daucus carota* L. at Epsom Downs and Banstead Downs; on *Angelica sylvestris* L. at Oxshott; and on *Silaus pratensis* Bess. at Epsom Common.

L. rubi Heeger.—This species is the cause of swellings on the stems of various species of *Rubus*; it is not judging by my own experience at all common; I have searched for it in many districts and have examined large areas of brambles with but little success. I have found it at West Wickham, Coldharbour Common and Wimbledon Common; also at Brockenhurst, Hants.

The numerous white larvae pupate in the gall, the midges emerging in April, May and June of the second year; Chalcids I have also had emerge in some numbers during the same period.

Rhopalomyia millefolii H. Loew.—The urn-shaped galls of this species occur upon the stems of *Achillea millefolium* L., frequently at the base, but also at the leaf axils higher up; each gall contains one yellow larva which pupates therein. I have bred a fair number of this midge and all have emerged in August or September of the first year. I have no parasites of this species.

The galls I have found at Banstead Downs, Epsom Common and Epsom Downs; the earliest date I have found them is July 27.

Rhopalomyia (*Misopatha*) *ptarmicae* Vallot.—From galls of this species in the flower-heads of *Achillea ptarmica* L. I have had the midge emerge in October but have found empty galls in August; July 16 is the earliest date I have found this gall. Numerous larvae inhabit each gall in which they pupate.

The galls I have found at Limpsfield Chart, Bookham Common and Epsom Common; and at Brockenhurst, Hants.

Rondaniella (*Oligotrophus*) *bursaria* (*bursarius*) Bremi.—Considering the many localities in which the host-plant *Nepeta hederacea* Trev. occurs it seems rather surprising that the gall is not found more often than it is. I have found it at Effingham Common, Banstead Downs, Beddington Park, Epsom Downs, Walton Heath, Park Downs, Boxhill, Ranmore Common, Ashstead, Epsom Common, Dorking and Buckland Hills; also at Farnham Common, Bucks. In the majority of the localities mentioned it has been fairly plentiful, but I have failed to find it in some dozens of other places where I have searched for it and where the host-plant grew in profusion. The earliest date I have found it is June 23, and the latest November 10;

when the larvae are full-fed the gall falls from the leaf, leaving a circular hole ; a single white larva inhabits each gall where it pupates. The midges I have bred have emerged in September and October followed by Chalcids in the latter month ; these parasites I have also had emerge in May and June of the second year ; they were from galls still attached to the leaves at the end of October.

Phyctidobia solmsii Kieff.—*Viburnum lantana* L., the host-plant of this species, is fairly widely distributed over an extensive area, but the gall appears to be very local in its occurrence. I have found it at Woodmansterne, Boxhill, Woldingham, Ashtead and Riddlesdown ; and at Eynsford, Kent. The earliest date was June 12. The larvae are yellow and have usually left the galls by the end of July to pupate in the earth. I have made numerous attempts to rear this midge, but my efforts have all been unsuccessful.

Craneobia corni Gir.—This appears to be another rather local species. Its peculiar tooth-like gall is to be found on the leaves of *Cornus sanguinea* L., but I have failed to find it in many localities where Dogwood grows in profusion. The galls I have found at Boxhill, Banstead Wood, Epsom Downs, Croham Hurst, Dorking, Headley, Mickleham Downs, Ranmore Common, Lacey Green and Woldingham.

I have found it an extremely difficult insect to breed ; it emerges in May of the second year, and its orange yellow larvae suffer very heavily from the attacks of Chalcid parasites.

Hartigiola annulipes Htg.—This is another species which I have found very difficult to rear ; I have tried various methods of keeping the galls, but the yield has been very poor. One generally learns a good deal from failures, but with this and the last-mentioned species I am afraid that I learnt but little from them. A single white larva occupies each gall in which it pupates, the midge emerging in April of the second year, Chalcids usually coming out in May.

The galls on the leaves of *Fagus sylvatica* L. I have found at Burgh Heath, Leatherhead, Croham Hurst, Limpsfield, Riddlesdown, Friday Street, Mickleham, Ranmore, Beddington Park, Park Downs, Banstead, Epsom Downs, Boxhill, Banstead Wood, Ashtead Common, Barnthorne Wood and Walton Heath. The earliest date I have noted them is June 26.

Macrolabis corrugans F. Loew.—The galls of this species I have found in August and September on leaves of *Heracleum sphondylium* L. at Park Downs and Boxhill ; and on *Peucedanum sativum* Benth. and Hook. at Dorking and Mickleham. The gregarious white larvae usually leave the galls sometime in August ; they pupate in the earth and the midges emerge at the end of the following April, numerous Chalcids often coming out in May.

Taxomyia taxi Inch.—The gall of this species is not at all uncommon where the Yew, *Taxus baccata* L. flourishes; it takes the form of a terminal tuft of leaves not unlike a miniature pine-apple in appearance; these often remain on the tree long after the midge has emerged. I have found them at Boxhill, Leatherhead, Fetcham Downs, Mickleham, Park Downs, Riddlesdown, Dorking, Ranmore Common, Banstead Wood, Epsom Downs, Ashtead, Walton Heath, Friday Street and Merrow Downs; also at Eynsford, Kent.

The larvae are red and pupate in the gall; I collected numbers of these galls in the autumn for several years, but failed to rear the insect from them; I then waited until the spring, collecting galls in April and May. This proved a successful method, the midges coming out freely from May 13 to 29. On several occasions I found the galls inhabited by the larva of a Lepidopteron, *Batodes angustiorana*; I cannot say whether these larva fed on the gall-mass or simply used them as a convenient place to pupate in. The moths emerged in May; needless to say no midges came from these infested galls.

Schizomyia galiorum Kieff.—The yellowish larvae of this species inhabit the flower-buds of several species of *Galium*, causing them to swell considerably and to remain closed; they pupate in the earth. I have found them on *Galium verum* L. at Park Downs, Ashtead Common, Banstead, Mitcham Common, Epsom Downs, Boxhill, Epsom Common, Walton Heath, Woodmansterne and Coulsdon Common; on *G. mollugo* L. at Park Downs, Dorking, Boxhill, Riddlesdown, Epsom Downs, Ranmore Common, Lacey Green, Mugswell and Woldingham. I have had the galls in July but the majority were observed in August.

The earliest date I have had the midge emerge is June 30 of the second year, the majority coming out from July 6 to 17; a few Chalcids have also emerged in July. This species appears to spend a very long period in the larval stage.

S. nigripes F. Loew.—The yellow larvae of this species cause the flowers of *Sambucus nigra* L. to swell considerably and remain closed. I have found them in fair numbers at Epsom Common and Banstead Wood; also at Lessness Abbey Wood, Kent, but have failed to breed out the midge.

10, Greenway,
Wallington,
Surrey.

COLIAS CROCEUS IN PERTHSHIRE.—On June 28 last I took a freshly emerged male *Colias croceus* and subsequently saw three other males all in good condition at Kinloch Rannoch, Perthshire.—P. HAIG THOMAS; Bowside, Strathy, Sutherland.

DESCRIPTION OF A NEW SPECIES OF *CREMATOGASTER* LUND, SUBGENUS *PHYSOCREMA* FOREL, WITH A LIST OF, AND A KEY TO, THE KNOWN SPECIES OF THE SUBGENUS.

By Horace Donisthorpe, F.Z.S., F.R.E.S., etc.

Crematogaster (Physocrema) moorei sp. n.

♀. Blackish brown, mandibles, lateral projections of clypeus, insertions of antennae, epinotum, petiole, joints two to four, and base of fifth of tarsi yellow; teeth black; shining and clothed with fine sparse yellow pubescence.

Head subquadrate, slightly narrowed anteriorly; posterior angles rounded, posterior border considerably excised in middle, extremely finely coriaceous, and minutely punctured, very finely longitudinally striate at inner sides of frontal carinae; *mandibles* longitudinally striate, armed with 4 or 5 teeth; *clypeus* triangular, convex and round in centre of dorsal surface, anterior border almost straight, posterior border semicircular; *frontal area* and *frontal furrow* not defined; *frontal carinae* short, diverging posteriorly, not extending as far as anterior border of eye; *antennae* moderate, 11-jointed, *club* 3-jointed; *scape* short, not extending as far as posterior border of head by about ⅓ of its length; *eyes* moderate, not very convex, situated behind centre of sides of head. *Thorax* narrowed anteriorly, slightly more conspicuously coriaceous than head; *pronotum* forming a neck, *suture* between pronotum and mesonotum not defined, *suture* between mesonotum and epinotum extending into a wide shallow furrow in centre; *epinotum* longer than pro- and mesonotum taken together, and considerably broader, very considerably inflated and swollen, broadest at base, where it is about as broad as head; *declivity* abrupt, flat, shorter than dorsal surface; a very large circular hole is situated on each side, beneath and close to the epinotal stigmata, being considerably larger than the latter. *Petiole* longer than broad, narrow, flat above, narrowed in front and behind, broadest about middle; *post petiole* transverse, broader and higher, but considerably shorter than petiole, rounded above and at sides, posterior surface with a circular constriction, or furrow, before apex; *gaster* short, heart-shaped, broader than epinotum. *Long.* 4·8 mm.

Type in B.M. (N.H.).

Described from a single worker—Philippine Is., Luzon, Bagnio, 25.ii.1920. Dr. A. Moore, B.M. 1922, 101.

This insect does not agree with any description of any known species of *Physocrema*. It comes nearest to *inflatus* Smith in appearance, but the scapes are shorter, the petiole is longer and narrower, and the whole insect is smoother and more shining, etc.

The following is a list of the species known to date:

1. *Crematogaster* (*Physocrema*) *inflatus* Smith, ♀. *Journ. Proc.*

Linn. Soc. Lond. Zool., **2** : 76, pl. 2, fig. 2 (1857). Singapore, Borneo (Sarawak), Indo-China.

2. *Crematogaster* (*Physocrema*) *difformis** Smith, ♀. *Journ. Proc. Linn. Soc. Lond. Zool.*, **2** : 76 (1857). Singapore, Borneo (Sarawak), Indo-China, Sumatra, Java.

Crematogaster (*Physocrema*) *difformis* Smith subsp. *physothorax* Emery, ☿. *Ann. Mus. Stor. Nat. Genova*, **27** : 506 (1889). Burma, etc.

Crematogaster (*Physocrema*) *difformis* Smith subsp. *sewardi* Forel. ☿ ♀. *Mitt. Naturk. Mus. Hamburg*, **18** : 64 (1901). Borneo.

Crematogaster (*Physocrema*) *difformis* Smith subsp. *vacca* Forel, ☿. *Bull. Soc. Vaud. Sci. Nat.*, **47** : 284 (1911). Malacca.

3. *Crematogaster* (*Physocrema*) *ampularis* Smith, ☿. *Journ. Proc. Linn. Soc. Lond. Zool.*, **6** : 47 (1861). Celebes. This species is omitted in the *Genera Insectorum*.

4. *Crematogaster* (*Physocrema*) *tumidula* Emery, ☿. *Ann. Mus. Stor. Nat. Genova*, **40** : 689, fig. (1901). Sumatra.

5. *Crematogaster* (*Physocrema*) *mucronata* Emery, ☿. *Ann. Mus. Stor. Nat. Genova*, **40** : 690 (1901). Sumatra.

6. *Crematogaster* (*Physocrema*) *bakeri* Menozzi, ☿. Philippines.

7. *Crematogaster* (*Physocrema*) *moorei* sp. n., ☿. Philippines.

I have omitted from this list, and also from the table, *Crematogaster* ("*Plysocrema*") *onusta* Stitz, ☿ (*Gesells. Naturf. Freunde*, Berlin, **1923**, 118, 1925). *Physocrema* spelt with an "l" instead of an "h" is, of course, a misprint, but I do not consider his species is a *Physocrema*. The club of the antennae is described as 4-jointed, the *epinotum* is given as of equal breadth to the rest of the thorax (not swollen in any way), and the insect is too small, etc. It is most probably a *Paracrema* Sants. The species have a 4-jointed club and the distribution is India and Malaysia.

TABLE OF THE SPECIES.

1. Epinotum armed . . . . . 2.
   Epinotum unarmed . . . . . 3.
2. Spine longer and sharper, opening to gland smaller *tumidula* Emery.
   Spine shorter, less sharp, opening to gland larger *mucronata* Emery.
3. Thorax strongly constricted in middle . . . . 4.
   Thorax not strongly constricted in middle . . . . 6.
4. Scapes not extending beyond posterior border of head *difformis* Smith.
   Scapes extending beyond posterior border of head . . 5.
5. Petiole longer and more slender . . . *bakeri* Menozzi.
   Petiole shorter and broader . . . *ampularis* Smith.
6. Scapes extending beyond posterior border of head *inflatus* Smith.
   Scapes not extending beyond posterior border of head *moorei* sp. n.

* Emery (*Gen. Ins.*, **174***b* : 139, 1922) gives it incorrectly as "*deformis*."

Forel (*Mem. Soc. Ent. Belg.*, **19**, 220, 1912) established the subgenus *Physocrema* for the reception of the species of *Crematogaster* with the epinotum swollen, or inflated (renflé), and he mentions *inflatus* Smith, *difformis* Smith, and *montezumia* Smith as examples without, however, fixing a type. Wheeler (*Ann. New York Acad. Sci.*, **23**, 82, 1913) cited *inflatus* Smith as type. Emery (*Gen. Ins.*, **174***b*, 139, 1922) limits the subgenus to the Indo-Malayan species, in which the club of the antennae is 3-jointed, excluding the American forms *arcuata* Forel and *montezumia* Smith (and subspecies) with a 2-jointed club. These are placed in the subgenus *Orthocrema* Santschi. The characters of *Physocrema* are :—☿ and ♀: frontal carinae developed; antennae 11-jointed, club 3-jointed; epinotum more or less swollen. ♂: Antennae 12-jointed. Thorax short and broad; epinotum not much swollen.

These very interesting insects play the part of "Honey-ants," the thorax, however, instead of the gaster being swollen, the swollen part of the thorax forming a pocket for the reception of a sweet secretion. The inflation of the epinotum is due to a pair of subcutaneous cavities with rigid walls filled with air. These cavities each consist of a chamber in which the cribellum of the metasternal glands opens. The external opening is situated in the epinotum, and there appears to be a continual flow from this aperture of a sweet fluid. Smith noticed that in dried specimens crystallized particles were apparent, not only within the orifice itself, but also scattered over the surface of the inflation. Bingham observed workers of these ants licking one another's thoraces vigorously. The opening is larger in some of the species (*inflatus*, *moorei*), not so large in *difformis*, and in *mucronata* and *tumidulum*, in which the epinotum is not so swollen, it is represented by a slit. The position of this orifice varies with the species; but in any case it is homologous to the regular opening of the metasternal glands in all ants, which is present in all the castes, and does not exist in any other members of the Hymenoptera.

CELASTRINA ARGIOLUS IN THE CITY.—As I was walking down King William Street, City of London, to-day (August 22) at 11 a.m. (B.S.T.), I saw flying towards me a blue butterfly which proved to be a female specimen of *C. argiolus* in fresh condition. Its flight appeared to be weak and the specimen showed signs of exhaustion as though it had travelled a long way, and its capture would have been an easy matter. It tried to settle on some sandbags. An unusual visitor to the heart of the "blitzed" city. In previous years I have seen *Pieris rapae*, *P. brassicae*, *P. napi*, *Aglais urticae*, *Vanessa atalanta*, *Nymphalis io*, *Gonepteryx rhamni* and *Polyommatus icarus* all flying in various thoroughfares of the City of London at different times.—A. E. STAFFORD; 83, Colborne Way, Worcester Park, Surrey.

THE VALUE OF THE PUBLICATION OF RECORDS.

By Martin E. Mosely.

A few years ago, after the publication of the *Collector's Handbook on British Caddis Flies*, I received a pained letter from a correspondent of many years' standing, complaining that I had scarcely given any locality records. I was a little amused at the letter, as I had purposely omitted them. Anyhow, as the result of this letter, I began to wonder if records in such a restricted area as the British Isles could have any but an historical interest, or, if of scientific interest, whether their publication were not calculated to do harm rather than good. No one can possibly question the value of records over a world-wide or even continental area. We have learnt so much from such records about the world we live in that to suppress them would be the height of folly and unscientific in the extreme. But exact records in the British Isles, our back garden so to speak—of what service is their publication ?

I imagine the desire on the part of the collector for records is that he may obtain an easy guide to the habitat of any particular species he may wish to add to his collection. But does the publication of a record always have this result ? Many years ago I wished to ascertain if *Apatania muliebris* really did constitute an example of parthenogenesis, as suggested by McLachlan, and I devoted a week-end to the matter. In McLachlan's monograph it is stated that the species occurs in abundance at the outfall of a lake at Arundel, and that McLachlan had paid many visits to it between May and September, capturing over a hundred examples. Accordingly I visited the lake during the week-end in question, and in the period stated, and never saw a single example. Nor did the terrain seem in the least suitable for the species, as a mill had been established at the outfall since McLachlan's visits. A change in the nature of the ground had ensued, with the consequent disappearance of the species from that locality. So much for this record.

One of the prizes of the Trichoptera collection is *Neuronia clathrata*. In McLachlan's collection are examples labelled "Tottenham Marshes," taken some time in 1860. I should doubt whether anything of special interest in the Trichoptera still exists in this locality. In the same collection are numerous species, some of which are considered to be local rarities, taken in the neighbourhood of Forest Hill. I hardly think any Trichopterist would now select Forest Hill for a collecting expedition. In the British Museum is an extensive collection made by Mabille, seventy or eighty years ago, in the vicinity of Paris, mostly by the banks of the Seine. This

river is now so polluted that Trichoptera are practically extinct in Paris, a few surviving only in the artificial waters of the parks and in the Bois.

It is stated that *Agrypnia picta*, another prize, has been taken at a London lamp-post. Unfortunately the record does not give the name of the street, so the collector is faced with a search extending over several hundred square miles. Another species, very rare, *Caborius dubius*, is said by Stevens to have been taken "near London." This record covers an area of several thousand square miles. Similarly we have records of desiderata "near Worcester" and "near Scarborough." I doubt whether this would be sufficient guidance for even the most enthusiastic of collectors.

So much for the Trichoptera. Consider the Lepidoptera. The habitat of a very local species is published and at once a horde of amateur entomologists descends upon the spot like a swarm of locusts, and in very few seasons the insect is extinct in these islands. This has been the fate of the Large Copper and others. Here, then, the publication of a record is quite obviously disadvantageous to science. In the lesser known Orders, such as the Trichoptera, the harm done by publication is more insidious.

In my British Caddis Fly Handbook I have devoted a few pages at the end to encouraging collectors to make their own records. The British distribution in the Order is scarcely known at all yet, and unless collectors look for themselves for any particular species they may want, if they only have to turn to some record and read where they may go for it, very little progress in our knowledge of these insects will be made. Consider, too, the thrill the collector will get if he finds his desideratum in an entirely unsuspected place. I myself have had such a thrill when I found two species, new to the British fauna, in a small lake which I had rented for pike fishing for over twenty years, and had never even suspected their presence.

Perhaps the answer to this question is that records should be collected in the British Museum, and not published to the world at large at all.

CLOUDED YELLOW IN ABERDEENSHIRE.—A female specimen of *Colias croceus* was netted by me in Glen Muick, near Ballater, on June 30 of this year. The following day (July 1), while in Glen Slugain, Braemar, I saw another, also I think a female. On September 7 Mr. H. Mutch, of Aberdeen, caught another, this time a male, while it was flying among a number of Green-veined Whites near the mouth of the River Don at Aberdeen.—DOUGLAS SANGSTER; 69, Leadside Road, Aberdeen, September 20, 1941.

ON REARING LEPIDOPTERA.

By Frank Littlewood.

(Continued from p. 209.)

Treatment of Partially Double-brooded Species.

Many species of moths (e. g. *A. populi*, *P. tremula*, etc.) which are single-brooded in the north of England and in Scotland may be double- or partially double-brooded in the south of England. And while a proportion of the pupae formed in the summer lie over winter, the others produce imagines within a few weeks of the larvae spinning up or going down.

Clearly with pupae of this uncertain habit it does not do to assume that all will lie over, and to pack the pupae away at once into their winter tins. Instead, the earthenware seed-pan, which forms the base of the final feeding-cage, is placed for the time being in a large pupa-cage. The earth in it has already been moistened, and will keep damp for a few weeks longer in the slightly damp atmosphere of the pupa-cage. The pupae themselves are at this stage not disturbed in any way. But after the end of August, when all the moths that are going to emerge will have done so, the rest of the cocoons are turned out and packed away in their winter tins. Only a limited number of larvae are allowed to pupate in one pan, to avoid a crowding of cocoons which might result in some of the moths being unable to get out.

Pupae that fail to emerge at the usual time are allowed to remain in the pupa-cage for a month or two longer, as they may be examples of retarded emergence. Certain kinds (e. g. *P. dictaeoides*, here in the north) will continue to dribble out long after the proper time. Such individuals, if captured at large, would undoubtedly be considered to be specimens of a second brood. When, however, it can safely be decided that pupae are going to lie over a second winter (and this is a more frequent habit than is often realized), they are packed into their winter tins and kept in a cooler situation.

Pupae of *N. lucina* will often form up and emerge during the winter months, even in a cold room; and I have bred *T. rubi* similarly as early as February. Taeniocampids may emerge quite early in the year, a couple of months before the usual time, so that one should never forget one's pupae at any time of year. An occasional glance may prevent a serious and disappointing loss.

Winter Storage of Pupae.

Pupae that are to be held over winter, and are not expected to produce imagines until the following year, are not immediately

placed in the pupa-cage on their removal from the breeding-cages; in fact they are not put in until just a week or two before the emergence of the perfect insect.

The problem of how to keep pupae in a state of health during their long winter rest is one that has for generations exercised the minds of lepidopterists; and many and various have been the solutions offered.

The method I employ is in the main that advocated by both Rippon and Newman, but on one or two points I differ from these authorities. The principle of my own method of winter storage is the same for all kinds of pupae, namely, removal from the cages or pots; confinement in small, closed, nearly air-tight tins; kept quite clean and dry in a cold indoor cellar temperature, shielded from the rude extremes of winter weather.

This somewhat artificial treatment has proved to be the best, and to yield the highest proportion of successful emergences. Attempts to follow Nature's methods in their entirety, by exposing pupae to out-of-doors conditions—frost, snow, rain—often end disastrously. This is not really surprising, for Nature, with quite other ends than ours in view, is at equally elaborate pains to kill as to preserve; and, unlike the ambitious collector, does not strive to bring to maturity one hundred per cent. of every brood.

The tins referred to are the little metal boxes used so commonly nowadays for the packing of tobacco, toffee, etc. The small hinged tins in which Allenbury's pastilles are sold are particularly useful as they are of a convenient and uniform size. All tins are, of course, thoroughly cleansed before being used for pupae.

Batches of bulky cocoons, or of the larger bare pupae, require a bigger tin; but in every case I use the smallest size possible, and prefer to distribute a brood of pupae among several small tins rather than put all into one of more roomy proportions. For it is of no little importance, I hold, that the air the pupae are allowed during this dormant stage should be limited and confined. It is this enclosed condition that prevents the pupae from drying up, and precludes the necessity of damping even those species (e. g. *P. pedaria*, the Taeniocampids) which are notorious for dying off in that manner during the winter months. Many of these species have the moth already formed in the shell before the winter begins, and unless properly handled are very prone to dry up. For these peculiar kinds, tins that are practically air-tight have proved to be the best; that is to say, tins such as the glass-top metal boxes used for larvae, which have more tightly fitting lids than the hinged tins referred to above.

The amount of air pupae actually require is very small indeed, and even an air-tight tin need not be opened more than once or

twice during the winter for the purpose of renewing the air-supply. But there is a possible risk in the use of completely air-tight tins. Occasionally a pupa will die—not from any fault in the system of management, but perhaps from some accidental injury, or as the result of disease contracted in the larval stage. If this should happen and the dead pupa is overlooked and not removed, its subsequent decomposition will contaminate the enclosed air of an unventilated tin and may injuriously affect the companion pupae. Whereas if the tin is only nearly, but not quite, air-tight, the risk of serious contamination will be very greatly reduced.

But, whichever pattern of storage-tin is favoured, it is advisable to make a periodical examination of one's pupae during winter, and remove any that do appear unhealthy. Such examination can, of course, only be complete in the case of bare pupae. Those in cocoons have to take their chance. For cocoons should never be opened for this purpose. But a dead pupa enclosed in a cocoon is less dangerous than one that is bare.

When the pupae are first packed into their tins every care is, of course, taken to insure that none is included that is already dead, malformed, or only doubtfully healthy. Given this initial discrimination, the danger I have referred to is not likely to give much trouble.

A label denoting the contents is affixed to each tin. Metal boxes, exclusively, are used for the winter storage of pupae. Chip or cardboard boxes should be avoided, as in the damp air of winter they are, by reason of the glue they contain, almost certain to develop a growth of mould. Moreover, they are not so cool, and being made of absorbent materials they encourage the tendency of pupae to dry up, whereas a metal box seems to counteract it.

The cocoons and pupae are simply laid on the bare smooth bottom of the tin, without any soil or other covering, and the lid is kept closed. Bare pupae are not mixed up with those in earthen cocoons, for the cleaner a bare pupa is kept the better. It is important that nothing should be allowed to choke the spiracles or to penetrate and clog the segmental incisions. A cocoon is, for any species that possesses it, a natural safeguard; for no matter what it is made of, its inside surface is always smooth and clean. And even the pupa which we term "bare" lies, if undisturbed, clean and snug in a cell or cavity which the larva has, consciously or unconsciously, moulded in the earth before turning. Bearing in mind this fact, naked pupae, when tumbled out of their pots, and before being packed away in the tins, have any dust or adherent particles of peat or sand either blown or carefully brushed off them. For convenience, all the small tins are collected together and enclosed in one large tin, which is kept with lid closed. This lid

has a small aperture covered with fine mesh perforated zinc, for ventilation, and is proof against vermin of all kinds.

The large tin, or winter cage, is stored on a shelf in the cellar, in a position where it will not be disturbed by anyone but its rightful owner. It has been recommended that the tins be kept on a stone floor for the sake of coolness. It is a reasonable suggestion, but I have not found this extra precaution to be necessary. The air temperature of my cellar is, in winter, never above 40° F. Tested during very hard frost the mercury did not fall below 32° F., although the garden thermometer on the same night registered 24 degrees of frost. So that I am quite safe in saying that my pupae never experience a temperature below that of freezing-point.

While the full effect of frost on wild pupae is a matter for conjecture, one fact is demonstrable enough, and that is, that pupae in captivity can carry on quite comfortably without being actually frozen. My own belief is that, in a state of nature, a moderate amount of frost will be tolerated by most pupae, but that prolonged hard weather will take toll of the more delicate species. Naturally, most pupae have the advantage of some cold-resistant or waterproof covering, which the larva has made or appropriated before its change, and bare pupae are snug underground. The bare pupae of the Rhopalocera will no doubt have become specialized and so adapted to endure occasional adverse conditions; or—just as likely—may, some of them, die under the stress of bad weather. For the recurrence of the perfect insect each season proves no more than that a proportion of the pupae have survived the winter; we have no record of those that have succumbed. Probably the consistent scarcity of many species is attributable to their inability to cope successfully with our winter climate. And when it can be shown that both imagines and hibernating larvae are killed by severe frost, it does not seem to be quite reasonable to assume that in their remaining stages, as ova or pupae, insects are wholly immune.

So that when it is argued that because wild pupae are exposed to frost our captive pupae must be treated likewise, I disagree. The conclusion I have arrived at after many years of experiment and observation is that while coolness is a very desirable condition for winter pupae, exposure to actual frost is not really necessary, and severe frost is fatal to delicate species. That is to say, a winter temperature ranging between 32° F. and 40° F. is both safe and satisfactory; and something like this is usually to be found in a cellar, pantry, or closed outhouse.

The Pupa-cage.

The design of my pupa-cage (or, strictly speaking, emergence-cage), though simple, embodies some special features that I regard

as important. The pupa-cage itself is made out of a light wooden packing-case, such as may be obtained from any grocer; just an ordinary rough box, measuring 16 in. by 12 in. by 9 in. It is roomy enough to make easy the boxing or bottling of specimens. Dividing a cage into compartments by means of partitions is a plan that has little to recommend it; when boxes are cheap and easily converted it is better to make additional smaller cages if for any reason it is desired to isolate particular pupae. But for ordinary purposes something like the dimensions given above makes a serviceable cage.

The cage has rough sides, and these afford the necessary foothold for the newly emerged insect, and obviate the employment of twigs, etc., which only take up valuable space. Many moths, and especially Geometrids, can cling readily enough to a smooth surface once their wings have dried. But all kinds, when they emerge, have the abdomen swollen and heavy, and must have an immediate and secure foothold provided for them, or they will tumble about in their efforts to climb, and end by being crippled. Sphingids and Bombycids are very restless and clumsy when first out, and only settle down to the serious business of drying when they have reached the top of the cage and can hang down from it.

Ventilation, which is inseparably connected with the special arrangement I employ for damping, is restricted, and is secured, not by the customary open gauze lid, but by a series of four 1-in. holes bored through two opposite sides, close to the top of the box, the idea being to ensure a *limited* outlet at the top of the cage—just enough to prevent stagnation. The holes are covered by strips of fine perforated zinc, tacked on the inside of the box. A tight-fitting glass lid closes the cage, and in addition to its main purpose, helps to make the cage vermin-proof—an important consideration.

A glass lid for a pupa-cage is, I believe, unusual, and may be an innovation; but it is a sufficiently important feature of my system to call for a detailed description. It consists of a sheet of glass fitted into a light wood frame, after the manner of the lid of an exhibition case. Over the underside of the frame is stretched a piece of *black* Brussels net—a material similar to mosquito net, but finer in texture, obtainable of any draper. The object of having the net black is that it is practically transparent, and does not obstruct one's view of the interior of the cage. Its function is to provide a secure foothold for those species that like to hang from the roof during the process of drying. Many moths refuse to settle down to drying until they are able to assume this pendent attitude. The same need is, of course, met by twigs stuck in the bottom of the cage, but after trying both methods I like the roof net better.

The lid is not hinged to the box; it is made to lift off, and is held in position by slips of thin wood nailed around the rim of the box. This closed glass lid controls the evaporation from the damping apparatus below, and preserves the *air* within the cage in a state of constant but never excessive humidity—a condition that appears to suit the majority of moths at the time of emergence.

Pupae at any stage of their life require very little air, much less than is commonly supposed. It is, I believe, the too free exposure to the open air, permitted by the old-styled gauze-covered cage, that is responsible for many of the cripples, and for pupae drying up—especially bare pupae and those that have had their cocoons opened. A cocoon is a natural protection against sudden variations and extremes of temperature, drought and humidity, as well as against predatory enemies and should never be opened unless it is impossible to avoid doing so.

Damping the Pupa-cage.

When a cage is ventilated, even in so limited a fashion, some provision for damping seems to be necessary. I shall show later on that damp in any form is not essential for many species (perhaps for all), provided the pupae are kept right up till and including the period of their emergence in tightly closed tins with a very restricted air-supply. But in this more ordinary type of cage air that is not quite dry appears to suit the majority of moths.

(To be continued.)

NOTES AND OBSERVATIONS.

Colias croceus in Lancashire.—I should like to record that I captured a single female *Colias croceus* on August 9 on sand dunes at St. Anne's, Lancashire, and I am almost certain that I observed a specimen of *Colias hyale* flying in a wheat field.—W. Peters; 19, Kenneth Crescent, London, N.W. 2.

Limenitis camilla ab. nigrina.—Further to my note of July 19 I should like to record that I took a second *L. camilla* ab. *nigrina* from the same locality a week later—Sunday, July 20. This specimen —also a female—is not quite in such good condition as the first. On September 10 I took a beautiful *Aglais urticae* ab. *nigra* fluttering on our sitting-room window here. The hind wings are uniform dark brown without a trace of orange-red or blue scales and the two black spots between veins 2 and 4 on the fore wings are completely absent. The insect, a large female, is in very good condition. With reference to Dr. de Worms' note on *Acosmetia caliginosa*, June 19 was about the usual date when one expected to find it in the Hampshire locality where I found it in 1931. I have not got my records with me, but

I do not remember having an emergence from pupae kept under outdoor conditions before June 10. No doubt it varies with the season.—P. A. CARDEW (Colonel); 105, Rushams Road, Horsham, Sussex, September 20, 1941.

LIMENITIS CAMILLA ♂ AB. NIGRINA AND ARGYNNIS PAPHIA AB. VALEZINA.—On July 16, 1941, I was fortunate in taking a completely black specimen of the above butterfly similar to the figure given in Frohawk's *British Butterflies*, p. 191, but without any white spots on the upper surface; and as regards the under surface this is also very similar to the second picture given on the same page without, however, any white edging to the wings. The place of capture was Stubby Copse, New Forest. It was flying in thick grass and appeared to be a large Ringlet on the wing before capture.

On the same day and also in Stubby Copse, I took a specimen of *Argynnis paphia* practically similar to Frohawk's picture on page 126, *British Butterflies*, with the centre row of black spots on the upper surface elongated.—G. H. HARRIS, M.D.; 5, Archer's Road, Southampton, August 14, 1941.

LIBERATION OF BUTTERFLIES.—The point at issue is simply whether the liberation of butterflies and other fauna and flora does or does not interfere with accurate records dealing with their distribution. To take an extreme case, *Papilio machaon* might possibly spread to Sussex or to Kent by natural means, but since it has been liberated, in the latter county, at any rate, it is impossible to be sure of this. The "naturalization" of *Limenitis camilla* in woods round London *has* given the false impression that it forms part of our local fauna. A fauna or flora is not stationary but, apart from "sentimental preference," the *natural* change therein is obscured by introductions. As I have already pointed out (*Entom.*, 1941, p. 119), the planting-out of a *foreign* species is less objectionable than introducing *native* species to new localities, though even the former is to be deplored. As Mr. S. B. Hodgson wrote (*Entom.*, October, 1940, p. 224), "Natural changes, whether progressive or retrogressive, are equally interesting, but will be undiscernible if the practice of planting species ever becomes widespread." I refer Lt.-Col. Eliot to Mr. Hodgson's whole letter, which puts the case in a form on which I cannot improve.—C. J. PATON; "Ormley," 7, Cavendish Road, Sutton, Surrey.

BUTTERFLIES FEEDING ON FILTH.—To the list of butterflies I have seen feeding on filth and other liquid (*Entom.*, **74**: 67) I am now able to add two more species. On July 9 I watched for about two minutes a ♂ *Ochlodes venata* feeding on a bird's dropping, and to-day I saw a ♂ *Pieris napi* feeding on horse-dung. This brings up the list to eleven species that I have seen.—F. W. FROHAWK; August 11, 1941.

LEPIDOPTERA IN SURREY, 1941.—Last year I recorded the occurrence here of a number of *Parascotia fuliginaria*. The woodpile in which these were taken was again examined this year on various

occasions in June and July, but the sole success was one female taken on July 26. As I had been away for a fortnight previous to the 26th, the main emergence may have occurred in my absence. The recent felling of a large number of pines in the neighbouring woods is a happy omen from the point of view of this species.

On Sept. 7 this year I took a ♀ *Pararge megera* with a pale cream ground-colour in the garden here. *Pegmera* has been very common here recently, together with abnormally large numbers of *Lycaena phlaeas* and *Polygonia c-album*.—H. L. G. STROYAN; Auchengray, West Byfleet, Surrey.

ACHERONTIA ATROPOS IN SUSSEX.—A large number of Death's Head (*atropos*) larvae have been found near here. Two larvae were found within a week feeding on potato near Cuckfield, and have pupated. Three larvae and a pupa were found at Bolney, and the woman who has them said that five others were found there, one of which had been killed.—R. MITCHELL; Rookwood, Cuckfield, Sussex.

ACHERONTIA ATROPOS IN SURREY.—My friend Mr. H. E. Pounds has kindly handed me a pupa of *A. atropos*, which was found this year in Surrey. It was dug up on a potato plot at North Holmwood on September 7 last by Mr. T. Hillyer, who states that it was found about 3 ft. from the edge of the plot.—WILLIAM E. BUSBRIDGE; "Gresham," Bradbourne Park Road, Sevenoaks.

GASTROPACHA QUERCIFOLIA (THE LAPPET MOTH) IN NOTTS.—My friend Mr. Symonds showed me a lovely specimen of this moth on his setting board. He had bred it from a larva found in a local nursery garden. I don't know if it is new to the county or not.—A. S. B. F. P. WYNNE; Upton House, Upton, nr. Newark, Notts.

[Carr, *Invert. Fauna Notts*, records it as very rare and local.—ED.]

CINNABAR LARVAE ON GROUNDSEL.—In a Ewhurst (Surrey) garden this July I found large numbers of *Callimorpha jacobaeae* larvae feeding on groundsel (*Senecio vulgaris*), much of it stripped to the stem; many looked starved. Explanation appears to be that in the surrounding district the usual food-plant, ragwort (*Senecio jacobaea*), was scarce. One rough uncultivated field in a wood, formerly full of ragwort, was devoid of it.—ERIC EVANS; 144, Nicolas Road, Chorlton-cum-Hardy, Manchester.

CINNABAR LARVAE ON GROUNDSEL AND SOW THISTLE.—This caterpillar has been in great profusion in my garden this year. Its chief food-plant is groundsel and every leaf was stripped, but the flower beds were not attacked. Its next favourite food appeared to be sow thistles.—Lt.-Col. R. R. B. ORLEBAR; Hinwick House, near Wellingborough.

RHYACIA SIMULANS IN WILTS.—This rarity usually found on the Dorsetshire coast has again occurred in this district. I took a fine specimen in my garden on June 8. This date is considerably earlier than my previous note for it in the Journal of the *Soc. Brit. Ent.* (1 : 216). South (1 : 214) says the moth flies in July, August and September. Its appearance therefore seems to cover a wide period.

Another rare species which I have captured is *Heliothis peltigera*, which in the August *Entomologist* is also recorded for the Wareham district. A full-grown larva of *Apatele alni* on August 1 is also perhaps worthy of mention.—Rev. WALTER L. FREER; Chute, Wilts.

COSYMBIA PENDULARIA VAR. SUBROSEATA WOODFORDE IN BOURNEMOUTH.—I have bred a single specimen of this variety from a larva beaten off birch last September in Bournemouth. I have been able to compare it with some typical specimens from Staffordshire and find it identical with these.—F. C. FRASER; Bournemouth.

LEPIDOPTERA IN THE ISLE OF ISLAY.—The following records made by R. L. Wilks near Bowmore, Islay, seem interesting. They are extracted from his diary kindly lent me for the purpose.

Geometra papilionaria L.—This has only been recorded as far as the Hebrides are concerned from the larger inner islands.

Female Ringlet.—On the banks of Loch Gorm. I cannot tell whether this is *C. tullia* or *A. hyperantus*. If the former is intended then the insect is of fairly general distribution in both the Inner and Outer Isles. If the latter is meant (and I believe it is !) the record is a good one.

Plusia festucae L.—On an island on Loch Gorm. Not seen by us in any of the Hebrides, Inner or Outer.

Plusia pulchrina L.—None too common in the Hebrides.

Lomaspilis marginata.—Only reported from larger Inner Isles. The date given (July 7) is very late. I have seen it on Rhum and Raasay in late May and early June.

Ectropis punctulata (Grey Birch).—I think this is an error. Date and distribution are against it, although in the case of Hebridean insects one's notions of ranges are apt to be shattered !

Trochilium crabroniforme.—A rather interesting capture and not likely to be confused with any other possibility.

Hepialus hectus.—Only thinly distributed in the islands and only reported from a few.

Cidaria fulvata L.—Rather rare generally in the islands although found on several.

Argynnis aglaja L.—The "possible Silver Washed" is certainly this, which abounds on most of the islands. He records it definitely as *A. aglaja* elsewhere.

Lycaena phlaeas L.—This is an interesting "take" as we have only seen it on Colonsay.

Pararge aegeria L.—This is a very good take and links up with fairly recent captures in Skye and near Morar.

Epione apiciaria.—This is unusual in the Hebrides, but we took it on Eigg, etc.

Celaena haworthii.—On most of the islands but not common.

Polia chi L.—Only taken by us on Raasay.

Euphydryas aurinia.—Links up with previous Islay and Jura records and possibly with our Gunna colony.

Miselia oxyacanthae.—Well worthy of note, as the moth cannot

be expected generally in the islands on account of the lack of hawthorn.

Laothoe populi L.—Only on the Inner Isles, but sometimes not rare. Coll is the most westerly record.

Cerura furcula L.—A good record. Coll, Raasay, etc., are our only stations.

Colocasia coryli L.—Occasionally not rare in the Inner Isles.—(Prof.) J. W. Heslop Harrison.

Butterflies Caught by Spiders.—On August 4 in Monks Wood, Huntingdonshire, I saw a fresh female *Maniola jurtina* caught on a bramble blossom by a pale-green "crab spider," perhaps *Misumena vatia*, lurking either in the heart of the flower or under the petals. My attention was attracted by the butterfly fluttering on the blossom, and I watched it slowly struggle down a few inches to a leaf below. Owing to its colour the spider was very conspicuous on the butterfly's back, and seemed to be partially holding the wings together with its legs. After two or three minutes the *jurtina* seemed to be paralysed, showing no sign of life except twitching antennae; the spider released its grip, crept along the body and seized the head, perhaps administering the *coup de grâce*. After a minute or so it then attached a strand or two of thread and quickly hauled the butterfly up to the blossom again, seeming to secure it there, and commenced to feed on it. Crab-spiders are well known to capture butterflies, but perhaps it is only when actually seeing them do so that one appreciates the strength and dexterity that enable them to pin down winged insects of this size without the help of a web before killing them. It has been suggested to me that these spiders may sometimes lie on their backs in a flower when waiting for their prey. In this position they would probably seize a butterfly by the head and kill it immediately.

In early July *Strymon pruni* was fairly common in the same wood, settling on privet in preference to any other flower. Many sprays of privet were covered with fine web; out of some score of these webs closely examined in one part of the wood three contained recognizable dead *pruni* and two contained butterfly remains, probably of this species. The very small brown spider responsible (*sp.?*) apparently takes an appreciable toll of *pruni*.—S. B. Hodgson; 5, Charles Street, Berkhamsted, Herts, August 15, 1941.

Corymbites cupreus F. in Bournemouth.—Last year I reported in this Journal the capture of a specimen of this northern species in my garden in Bournemouth, 19.v.40. On 7.vi.41 I took a second specimen, also in my garden. It was flying low across the lawn in full sunshine when I knocked it down with my hand. Excepting the doubtful Exeter record, this is the second specimen taken in South England.—F. C. Fraser; Bournemouth.

Heptagenia lateralis (Curt.) (Ephemeroptera) Attacked by a Dipteron.—Early in May a male of this species was taken in flight on the shore of Windermere and was found to have a small

dipteron upon its thorax. The fly was apparently sucking the rear portion of the head of the *lateralis*. The two specimens were placed in a tube and later the Ephemeropteron was found to be dead. About a fortnight later another male *H. lateralis* was seen with a dipteron upon its thorax, but it escaped before it could be captured.

The dipteron was submitted to Mr. R. L. Coe, of the British Museum, who replied that it was a female *Palpomyia semifumosa* Goet. (Ceratopogonidae). He adds : " Many female Ceratopogonidae have blood-sucking habits, and Dr. Edwards (*E.M.M.*, 1920, p. 205) has recorded a species of *Palpomyia* attacking a May-fly. In that case the fly inserted its proboscis into one of the May-fly's eyes during flight of the latter."—D. E. KIMMINS ; Dept. of Entomology, British Museum (N.H.).

SYMPETRUM FONSCOLOMBII SELYS.—In connection with notes already published (*Entom.*, **74** : 187), it is of interest to report that from 9 a.m. to 3 p.m. on August 15 scores were seen, of which 15 were taken. Males were flying over ponds, a few were ovipositing and other females seen on open heath. Numbers had been seen since last week of June and when first noted were fully adult, but oviposition not seen until July 10. On September 14, 1940, a teneral male was taken on open heath at Bournemouth, but not published then.—Lt.-Col. F. C. FRASER.

AGRILUS VIRIDIS L. IN THE NEW FOREST.—A single specimen of this rare beetle was beaten from sallow at Linwood during July this year. . The specimen is now in Mr. Harwood's collection.—Lt.-Col. F. C. FRASER ; 55, Glenferness Aven., Winton, Bournemouth, August 15, 1941.

HETEROPTERA RECORDS, 1941.—In view of the recent appearance of *Lygus rubicundus* Fall. in Cambridge, it may be of interest to record that I took an example of this species from a small Elder bush on the banks of the Cam in Grantchester meadows on May 1 this year. I was also interested to find *Corizus maculatus* Fieb. in large numbers in a small marshy spot at West Byfleet in June this year, flying and running very actively in the sunshine over Juncus and Bramble bushes. I had beaten one previously near the same spot from a small birch (21.ix.40).—H. L. G. STROYAN.

SOUTH LONDON ANNUAL EXHIBITION OF VARIETIES.—Attention is drawn to the notice of this exhibition (on p. 4 of cover), which the Society has decided it may be opportune to resume after a lapse of two years. The pre-war shows at Hibernia Chambers, where many of the best of the year's captures of British insects were exhibited, were extensively known and well attended by entomologists from all parts of the country. Some striking exhibits are already promised for this year. Due to difficulties of the times it has reluctantly been decided that refreshments cannot be provided. The new headquarters of the Society, where the exhibition takes place, is close to London Bridge Station (S.R. and Tube).—F. STANLEY-SMITH (*Hon. Secretary*).

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A CHANGE OF NAME AND A KEY TO THE BRITISH SPECIES OF *CARTODERE* (COLEOPTERA, LATHRIDIIDAE).

BY H. E. HINTON, Ph.D.,
Department of Entomology, British Museum (Natural History).

Cartodere (*Dienerella*) *elegans* (Aubé).

1850. *Latridius elegans* Aubé, Ann. Soc. ent. Fr., (2) **8** : 334.
1933. *Cartodere pilifera depilis* Belon, Blair, Ent. mon. Mag., **69** : 41.

A new addition to the British list of beetles was recorded by Blair (*l.c.*) under the name of *Cartodere pilifera* Reitter var. *depilis* Belon. I have compared the series of specimens on which this record is based with examples of *C. elegans* (Aubé) from Malta (J. J. Walker) and Tirol (Reitter) in the Champion Collection in the British Museum, and I find that the two series agree in all particulars. The European specimens of *C. elegans* fit the descriptions given by Fall (1899) and Reitter (1911) very well and moreover were so determined by Champion. *C. elegans* may be distinguished from *C. pilifera depilis* by having a large, shallow, transverse depression on the basal third of the pronotum. The broadly dilated labrum (Fig. 1) which embraces the clypeus at sides and the 2-segmented front (Fig. 2) and middle tarsi of the male should prevent it being mistaken for any other British species. Blair's specimens were found in the bed-room of a house in Bromley. Belon (1897) recorded it in a house in France.

KEY TO THE SPECIES OF *Cartodere* FOUND IN BRITAIN.

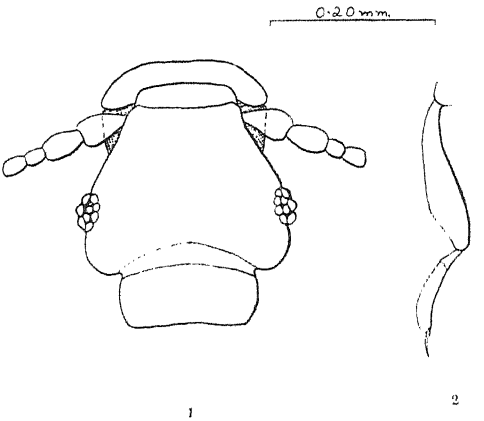
1. Labrum very broad and enclosing sides of clypeus (Fig. 1). Metasternum and first abdominal sternite densely and very coarsely punctate. Male with front (Fig. 2) and middle tarsi 2-segmented. Europe, N. Africa, N. America . . . . . *C. elegans* (Aubé) (1850)
Labrum narrower than clypeus and not enclosing sides of the latter. Metasternum and first abdominal sternite impunctate or at most only with microscopic punctures. Male with front and middle tarsi 3-segmented . . 2.

2. Antenna with club 2-segmented. Pronotum with a broad, shallow to moderately deep, oval depression on anterior half of disk. Each elytron, at about basal two-fifths, with a transverse callosity extending from lateral margin to fifth interval. Europe, N. Africa, N. and S. America *C. filum* (Aubé) (1850).

Antenna with club 3-segmented. Pronotum without a distinct depression on anterior half of disk. Each elytron without a transverse callosity on basal two-fifths . . 3.

3. Pronotum as broad or very nearly as broad as elytra ; sides broadly explanate . . . . . 4.

Pronotum much narrower than elytra ; sides not explanate 5.



FIGS. 1, 2.—*Cartodere elegans* (Aubé). (1) Dorsal view of head. (2) Tibia and tarsus of front leg of male.

4. Head with a broad, shallow, median, anterior depression between eyes. Eyes large and occupying hind angles of head so that temples are absent. Elytra with fifth and sixth rows of punctures separate well behind middle. Europe, N. Africa, N. America . *C. argus* Reitter (1882).

Head without trace of a median depression between anterior part of eyes. Eyes small and head behind eyes with well developed temples. Elytra with fifth and sixth rows of punctures coalescent before middle. Europe, U.S.S.R., Japan, N. America . . *C. filiformis* (Gyllenhal) (1827).

5. Species 1·0–1·2 mm. long. Elytra with seven rows of punctures on each elytron. Metasternal disk without a longitudinal groove on each side. Europe, N. Africa, Madeira, Canary Is., N. and C. America *C. fruficollis* (Marsham) (1802).

Species 1·3–1·8 mm. long. Elytra with six rows of punctures on each elytron. Metasternal disk with a complete longitudinal groove on each side . . . . 6.

6. Elytra with fourth interval carinate on basal fourth. Europe, N. Africa . . . *C. elongata* (Curtis) (1830).
Elytra with fourth interval feebly to moderately convex (rarely subcarinate) on basal fourth. Europe, N. Africa *C. elongata separanda* Reitter (1887).*

* I have examined a series of *C. separanda* from Sicily (A. Dodero) and Windsor Forest (H. Donisthorpe). The difference in the convexity of the fourth elytral interval of *C. separanda* and *C. elongata* is the only even partly reliable character I have found between these two forms. The other distinguishing features mentioned by Belon (1897) and Edmonds (1930) are valueless when applied to a moderate series of both. The fourth elytral interval of *C. separanda* is sometimes nearly as strongly convex as that of *C. elongata*; and, bearing in mind the great amount of variation in size and sculpture frequently exhibited by species in many groups of the family, it seems advisable to consider *C. separanda* to be only a variety of *C. elongata*.

Maniola jurtina ab. nigrianira nov.—The very unusual female aberration of *M. jurtina* described below was taken in South Hants on July 22, 1940. I have not heard of a similar specimen, but Mr. Riley tells me that there is one like it in the British Collection in the British Museum (N.H.), unfortunately without any data.

♀.—*Upperside:* Fore wing dark greyish brown, the fulvous blotch almost absent; apical spot black, with narrow orange surround. Hind wings dark greyish brown. *Underside:* Fore wings, orange, area much reduced by the heavy black band which surrounds the wings, narrowing from where the transverse line meets the costa; central transverse line heavy black; apical spot much reduced in size, with white pupil pin-point set in a distinct yellow ring which stands out against the deep orange, the whole having a blackish suffusion. Hind wings black, the central area a shade lighter.—J. FORSYTH-JOHNSTONE; Courtlands Private Hotel, Clarence Parade, Southsea.

AGLAIS URTICAE AB. PSEUDICHNUSA IN SURREY.—I had the good fortune to take to-day a specimen of *Aglais urticae* ab. *pseudichnusa* and also another with one spot in the middle of the fore wings obsolete. Both were taken in this neighbourhood.—B. HAROLD SMITH; Casa, Frensham Vale, Lower Bourne, Farnham, Surrey, September 27, 1941.

[This is the aberration which currently goes under the name "ichnusa." Reuss pointed out (1939, *Ent. Zs.*, **53** : 2) that many characters prove the Corsican *Aglais ichnusa* Hübner to be a species distinct from *A. urticae*. In the same journal he introduced the name *pseudichnusa* for the variety of *A. urticae* which has hitherto masqueraded under that name.—ED.]

DWARF PIERID BUTTERFLIES.—In August this year there were quite a number of small *Pieris napi* in this district and I captured two, both males, measuring 35 mm. I have another in my collection, also a male, caught at St. Ives, Cornwall, in August, 1920, which measures 34 mm.—Miss B. A. THORN; Heathcroft, Hertford Heath, Herts, September, 1941.

CHANGES IN NOMENCLATURE AFFECTING MALAYAN HESPERIIDAE (LEPIDOPTERA).

By W. H. Evans.

As a revised list of Malayan Rhopalocera is in preparation, it is desirable that any projected changes should be embodied, and accordingly a summary of the changes affecting the Hesperiidae is given below.

Genera *Bibasis* Moore and *Burara* Swinhoe.

Hemming (1934, *Gen. Names holarc. Butt.* : 156) pointed out that the name *Ismene* Swainson was preoccupied and must be replaced by *Burara* Swinhoe. A careful examination of the species of this genus and of the genus *Bibasis* Moore has shown that there is no real basis for generic separation; the secondary sexual leg characters, venation, antennae, palpi and genitalia are similar throughout. The type of *Bibasis* is *sena* Moore, and this species has a much modified wing shape, but it is certainly congeneric with *nestor* Möschler which, at any rate in the female, has the wing shape of *Burara*. It is recommended therefore that the species now included in the genus *Burara* should be transferred to *Bibasis* and the former name regarded as a synonym thereto.

Celaenorrhinus inaequalis irene nov.

♂, Gunong Ijau, Perak, Malaya; type B.M. Differs from the Javan subspecies *inaequalis* Elwes & Edwards only in lacking the small yellow hyaline spots in spaces 4 and 5 of the fore wing. In addition to the type the B.M. has 1 male from Sumatra and 5 males from Borneo.

Celaenorrhinus putra sanda nov.

♂, Dawna Range, Burma (W. H. Evans): type B.M. *C. putra* Moore is a species distinct from *leucocera* Kollar with which it has hitherto been confused; this is brought out by the difference in the genitalia. Superficially the two species are very similar: *putra* is considerably darker, and the cell spot on the upperside of the fore wing is not continued to the costa as is usually the case in *leucocera*. The two species fly together in N.E. India and Burma, but *leucocera* appears not to occur south of a line joining Tavoy and Indo-China. Typical *putra* has conspicuous orange spots on the upperside of the hind wing and is confined to N.E. India. In Burma and Malaya these spots are faint or absent, and it is to this form that the name *sanda* is now applied. The B.M. has 17

males and 2 females from Burma and one pair from Perak. Other subspecies of *putra* occur in Sumatra, Java and Borneo.

Tapena thwaitesi bornea nov.

♂, Perak, Jan. and Feb., 1890 (W. Doherty): type B.M. Elwes & Edwards (1897, *Trans. zool. Soc. Lond.*, **14**: 146) distinguished in the genus *Tapena* three species—*thwaitesi* Moore, *minuscula* Elwes & Edwards, and *hampsoni* Elwes & Edwards—which they separated on the very different clasp forms which they figured on plate 22. The specimen taken by them for *thwaitesi* came from Borneo, and they remarked that they had been unable to examine a specimen from the type locality, Ceylon, so it was possible that they had not correctly identified the species. Investigation has shown that the genitalia of typical *thwaitesi* from Ceylon are identical with those of *hampsoni* from S. India, as might have been expected. Therefore, a new name, *bornea*, is required for the form figured by Elwes and Edwards. The B.M. has 5 males from Malaya, 3 from Sumatra and 9 from Borneo of the subspecies *bornea*. Superficially, the various subspecies of *thwaitesi* are inseparable, but in Ceylon, India and Burma there are two very well-marked seasonal forms, while in Malaya, Sumatra and Borneo only the wet-season form occurs.

Odina hieroglyphica ortina nov.

♂, Perak, July and Aug., 1895 (Lakatt & Pamboo), *ex* Coll. Oberthür: type B.M. This subspecies is intermediate between typical *hieroglyphica* Butler from Borneo, with the orange and black areas subequal, and the Burmese *ortygia* de Nicéville, which is orange with narrow black markings. In *ortina* the costa of the hind wing is black as in *hieroglyphica* (orange in *ortygia*), but the spot in the middle of space 1b on the upperside of the fore wing is more than twice as wide as the dark areas on either side of it, while in *hieroglyphica* the black and orange areas are of equal width. The B.M. has 2 males and 1 female of *ortina* from Malaya. The new subspecies is figured in Distant, *Rhop. Malay.*, pl. xliv, fig. 25.

Unkana attina Hewitson, 1866.

Moore (1857, in Horsfield and Moore, *Cat. Lep. Ins. Mus. E.I.Co.*, **1**: 248) listed a species under the previously unpublished name of *Ismene ambasa* Moore (*P.Z.S.*, ined.) without description, from Java and N. India. On plate vii, figs. 6 and 6*a*, he figured the larva and pupa of the Javanese specimen, stating that *ambasa* fed on a species of *Pandanus* bearing the native name of *Pandan-duri*. Piepers and Snellen (1910, *Rhop. Java: Hesperiidae:* 55, pl. x,

figs. 82*a* and *b*) figure the same larva, which cannot be mistaken for any other, under the name *Unkana attina* Hew., and state that it lives in the rolled-up leaf of *Pandan-douri*. It can only be concluded that the name *attina* Hewitson must be superseded by *ambasa* Moore, the type locality being Java. The typical Javan form of *ambasa* differs subspecifically from the form *attina* occurring elsewhere in Malaysia in that the white area on the upperside of the hind wing is twice as wide as the dark border in *ambasa* and subequal in *attina*. Consequently, Malayan specimens should be known as *Unkana ambasa attina* Hewitson.

POLYOMMATUS ICARUS, MALE, AB. RADIATA.—I had the good fortune to take in this neighbourhood on September 7 a fine example of this rare underside aberration. On the upper wings there are five bars extending inwards from the outer margin, while the radiations round the border of the hind wings are slightly shorter. There is a heavy line in the *limbojuncta* position and the spots near the body are pear-shaped. The ground-colour and border are normal. The specimen approximates in markings to that depicted by Mr. Frohawk on Plate 28, fig. 1 of his book, *Varieties of British Butterflies*, but is slightly more extreme.—C. G. M. DE WORMS; 12, Harcourt Terrace, Salisbury, September, 1941.

GONEPTERYX RHAMNI ATTACKED BY PIERIS RAPAE.—On August 24 I was watching a number of butterflies imbibing on a *Buddleia* in my garden. They included about 10 *Nymphalis io*, some half a dozen *Aglais urticae*, several *Pieris brassicae* and *Pieris rapae*, and one each *Pararge megera* and *Thecla quercus*. Suddenly a female *Gonepteryx rhamni* appeared on the scene and tried to alight on a blossom. She was immediately attacked by a couple of *Pieris rapae*, and was not allowed to settle. At first I thought it was fun, but judging from the repeated "dive-bombing" to which she was subjected and the fact that she was driven off, I came to the conclusion that it was a real act of aggression on the part of the Whites, which returned to resume their feast. The Brimstone is not a common butterfly in this part of Suffolk, as buckthorn is not plentiful in the neighbourhood. No doubt this particular specimen had travelled a good distance, as she seemed quite unable to put up any sort of resistance against her smaller assailants. None of the other butterflies took the slightest notice of her, so it would appear that *Pieris rapae* is quite an aggressor in the insect world.—H. E. CHIPPERFIELD; 27, Chilton Avenue, Stowmarket, Suffolk, August 24, 1941.

VANESSA ATALANTA IN MARCH.—On Easter Monday, 1940, at about 2.30 p.m. a perfect *Vanessa atalanta* was taken here. Weather was fair, brilliant sunshine, wind west. The insect's flight was rapid and in an easterly direction.—A. H. PELL; 2, Church Lane, St. Martin's, Stamford.

THE INSECT FAUNA OF THE ISLE OF EIGG.

By D. Keith McE. Kevan, B.Sc.

During July, 1939, a party of biology students from Edinburgh University spent about three weeks on the Isle of Eigg in the Northern Ebudes, during which time a study of the fauna and flora was made.

It fell to my lot to try to undertake a survey of the insects which occurred on the Island, in which task I was greatly assisted by all members of the expedition, who returned from their botanizing and other pastimes of a rather less biological nature with specimens enclosed in vascula, tobacco-tins, match-boxes, and even in knotted handkerchiefs and sporrans, as well as in more orthodox containers! The Hymenoptera were almost entirely collected by Mr. Tom Warwick, B.Sc., who led the expedition, and both he and Mr. Joseph Hope, B.Sc., added extensively to my own captures, particularly of Diptera.

Owing to the War the entire collection, with the exception of the Coleoptera and certain of the minor Orders which were in process of identification, was deposited in the Royal Scottish Museum, where, during the feverish rush to put the collections in places of safety, the Eigg specimens found their resting-place in one of the cellars, whence they have only just been unearthed, in spite of determined efforts on the part of the writer.

The Coleoptera, Orthoptera and Odonata were the Orders most thoroughly collected, while certain Orders, such as the Plecoptera, Ephemeroptera, Psocoptera and Anoplura were, it is to be regretted, almost entirely neglected. No Neuroptera were observed.

Of the Order Hymenoptera, several excellent series of Bees were made by Mr. Warwick, including a series of the recently described Cuckoo-Bee, *Psithyrus campestris swynnertoni* (Richards, *Ent. Mo. Mag.*, No. 72), probably new to the Isles.

Coleoptera: 141 species were taken, of which 25 (5 of these being Hydrophilidae) were water-beetles. The water-beetles were collected very thoroughly and were checked by Prof. Balfour-Browne, to whom I wish to express my thanks. They include two species (*Hydroporus planus* and *Agabus nebulosus*) which are new to the North Ebudes and four others (*Hydroporus palustris*, *H. aquaticus*, *Haliplus fulvus* and *Agabus guttatus*) which are new to Eigg. The very restricted *Dytiscus* (*D. lapponicus*) still abounds in one small lochan on the island, where it has long been well known. It is present in such large numbers that it is difficult to imagine

where it finds sufficient food. The beetle does not appear to inhabit any other loch on the island.

Of the terrestrial Coleoptera, the most striking "find" by far was that of *Laemophloeus minutus*, a beetle which is normally found only in granaries in England. This extraordinary capture—which was verified by the late Prof. Sir T. Hudson Beare—was collected by sweeping in the open far away from any stored grain. The occurrence of this beetle in the Hebrides seems to be on a par with some of Prof. Harrison's finds in the Western Isles!

Rare Staphylinids taken were *Bessobia monticola* and *Drymoporus elongatus*, while the larger and more conspicuous (though less rare) beetles included four species of *Carabus* (*C. clathratus* and *C. granulatus*, western species, *C. arvensis*, a mountain species, and the common *C. catenulatus*).

Lepidoptera: These were not collected to any great extent, about 60 species being taken—mostly common Scottish species, or species of wide distribution.

By far the commonest was the Magpie Moth (*Abraxas grossulariata*), which could, without effort, be picked up by the hundred almost any day. The larvae fed on *Calluna*. This is an unusual food-plant except in the Hebrides. Common also were the Common Tiger Moth (*Arctia caja*), the Six-Spot Burnet (*Zygaena filipendulae*) and the Transparent Burnet (*Z. purpuralis*), while the Northern Eggar (*Lasiocampa quercus callunae*) and larvae of the Emperor Moth (*Saturnia pavonia*) and Fox Moth (*Lasiocampa rubi*) were quite frequent. The northern form of the Lesser Yellow Underwing (*Graphiphora comes* var. *curtisii*) was also taken. The occurrence of the Barred Straw (*Hydriomena dotata*), of which a pair was captured, is uncommon so far north.

Only eight species of Trichoptera were taken, but they included an interesting variation of *Leptocerus fulvus*, which possessed an additional cross-vein between R3 and 4 of the right fore wing.

Thirty-two species of Hemiptera were obtained, but only the Corixidae were collected with any thoroughness, the most interesting form being *Sigara germari*, which was taken in a small pool at the top of the Sgurr, the highest point on the Island. The most abundant species was *S. scotti*.

The Diptera were represented by nearly 80 species in the collection.

Smaller Orders: Some ten or eleven species of Odonata are known to occur in the North-West, and nine of these were found, though it was too early for adult *Sympetrum scoticum*. The green Damsel-Fly (*Lestes sponsa*) was the most prolific species, particularly at Druin an Lochain. The other three species of Damsel-Fly, which are usually very common, appeared to be rare on Eigg.

Both the Graat Golden-Ringed Dragonfly (*Cordulegaster boltonii*) and the Northern Aeshna (*Aeshna juncea*) were common.

Among the Orthoptera, the four common Scottish species of Grasshopper were taken, and also a specimen of the rare or overlooked Groundhopper, *Acrydium bipunctatum* (which I took also on the Island of Colonsay in July, 1938). Strangely enough, *A. vittatum*, the common species, was not taken.

The Dermaptera were, of course, represented by the Common Earwig (*Forficula auricularia*), which tends to be ignored in surveys.

The Aphaniptera were represented by two species, one, the ubiquitous *Pulex irritans*, which emerged in considerable numbers from cracks in the floor, etc., of our abode and caused a good deal of shortness of temper on the part of entomologist and non-entomologist alike when they rose in the morning, and the other, *Hystrichopsylla talpae*, from a Lesser Shrew—one of the largest fleas on one of the smallest mammals!

Classified List of Species of Insects taken on the Isle of Eigg, North Ebudes, July, 1939.

Thysanura.

Petrobius maritimus L. (3).

Collembola.

Lepidocyrtus cyaneus Tullb. (6).
Smynthurus viridis L. (4).
S. fuscus L. (2).
S. luteus Lubb. (2).

Orthoptera.

Acrydium bipunctatum L. (1).
Omocestus viridulus L. (8).
Chorthippus parallelus Ztt. (15).
Ch. bicolor Charp. (1).
Myrmeleotettix maculatus L. (2).

Dermaptera.

Forficula auricularia L. (2).

Odonata.

Lestes sponsa Hans. (8).
Pyrrhosoma nymphula Sulz. (3).
Ischnura elegans V. d. L. (1).
Enallagma cyathigerum Charp. (1).
Cordulegaster boltonii Don. (*annulatus* Ltr.) (4).
Aeshna juncea L. (5).
Libellula quadrimaculata L. (detached wing only).
Sympetrum danae Slz. (1 nymph).
S. striolatum Charp. race *nigrifemur* Selys (6).

Hemiptera.

Gerris odontogaster Ztt. (1).
G. costae H.-S. (5).
Velia currens F. (8).
Salda morio Ztt. (2).
S. saltatoria L. (1).
Anthocoris sylvestris L. (1).
Pitharus maerkeli H.-S. (brachypterous) (2).
Leptopterna ferrugata Fall. (2).
Bryocoris pteridis Fall. (brachypterous) (4).
Monalocoris filicis L. (2).
Calocoris bipunctatus F. (3).
Lygus pratensis F. (2).
Rhopalotomus ater L. (5).
Dicyphus errans Wolff. (a dark form) (1).

Mecomma ambulans Fall. (3).
Plagiognathus arbustorum F. (3).
P. viridulus Fall. (6).
Notonecta glauca L. (1).
Cymmatia bonsdorffi Sahlb. (1).
Sigara castanea Thoms. (4).
S. nigrolineata Fieb. (7).
S. scotti D. & S. (15).
S. praeusta Fieb. (1).
S. germari Fieb. (2).
Philaenus spumarius L. (4).
Ph. spumarius var. *fasciata* F. (1)
Ph. spumarius var. *lateralis* L. (1).
Ph. spumarius var. *marginella* F. (1).
Ph. spumarius var. *lineata* F. (3).
Ph. spumarius var. *populi* F. (1).
Ph. (*Neophilaenus*) *lineatus* L. (7).
Ulopa reticulata F. (Macropt.) (1).
Bythoscopus (*Oncopsis*) *flavicollis* L. (2).
Euacanthus interruptus L. (4).
Acocephalus (*Aphrodes*) *bifasciatus* L. (1).
Cicadula (*Macrosteles*) *fasciifrons* Stol. (2).
Macrosiphum pisi Kalt. (1).

TRICHOPTERA.

Leptocerus fulvus Ramb. (1).
Holocentropus dubius Ramb. (3).
Neuronia ruficrus Scop. (1).
Phryganea varia F. (2).
Ph. obsoleta McL. (1).
Limnophilus marmoratus Curt. (4).
L. centralis Curt. (1).
L. griseus L. (1).

LEPIODPTERA.

(Meyrick's nomenclature.)

Diacrisia menthastri Esp. (2).
D. russula L. (1).
Arctia plantaginis L. (3).
A. caja L. (6).
Acronycta rumicis L. (2).
Caradrina quadripunctata F. (1).
Hadena lucipara L. (1).
H. polyodon L. (10) (all degrees of melanism).
H. lithoxylea F. (8).
H. leucostigma Hb. (1).
H. didyma Esp. (1).
H. lucens Frr. (1).
Agrotis strigula Thnb. (1).
Graphiphora plecta L. (1).
G. pronuba L. (1).
G. comes Hb. (1).
G. comes var. *curtisii* Newm. (1).
G. festiva Hb. (1).
Charaeas graminis L. (1).
Leucania impura Hb. (1).
Melanchra brassicae L. (1).
M. oleracea L. (2).
Plusia chrysitis L. (1).
P. pulchrina Hw. (1).
P. interrogationis L. (1).
P. gamma L. (1).
Eupithecia nanata Hb. (1).
Eustroma populata L. (1).
Hydriomena dotata L. (2).
H. truncata Hufn. (2).
H. immanata Hw. (3).
H. caesiata Lang. (1).
H. albulata Schff. (1).
H. bilineata L. (2).
Xanthorhoë limitata Sc. (1).
X. montanata Bkh. (5).
Baptria atrata L. (1).
Opisthograptis luteolata L. (1).
Abraxas grossulariata L. (5).
Saturnia pavonia L. (larvae and pupae only).
Argynnis aglaia L. (melanic) (15).
Vanessa urticae L. (3).
Satyrus semele L. (4).
Epinephele janira L. (14).
E. hyperanthus L. (1).
Coenonympha pamphilus L. (8).
Lycaena icarus Rott. (2).
Pieris brassicae L. (1).

P. napi L. (6).
Phlyctaenia lutealis Hb. (2).
Phlyctaenia sp. ? (1).
Lasiocampa rubi L. (larvae only).
L. quercus L. var. *callunae* Plm. (3).
Odonestis potatoria L. (1).
Zygaena filipendulae L. (4).
Z. pilosellae Esp. (6).
Hepialus hecta L. (1).
H. velleda Hb. (1).
H. humuli L. (2).

COLEOPTERA.

Cicindella campestris L. (8).
Carabus clathratus L. (1).
C. granulatus L. (1).
C. arvensis Hbst. (2).
C. catenulatus Scop. (2).
Cychrus rostratus L. (1).
Notiophilus biguttatus F. (3).
N. hypocrita Ptz. (1).
Nebria brevicollis F. (8).
N. iberica Ol. (8).
Leistus fulvibarbis Dej. (1).
Elaphrus cupreus Duft. (2).
Loricera pilicornis F. (1).
Clivina fossor L. (4).
Bembidion lampros Hbst. (1).
Trochus obtusus Er. (1).
Pseudophonus pubescens Mel. (3).
Harpalus aeneus F. (3).
H. latus L. (2).
Abax ater Vill. (2).
Cyrtonotus (*Amara*) *aulicus* Pz. (1).
Poecilus (*Pterostichus*) *coerulescens* L. (1).
Lyperosomus (*Pterostichus*) *adstrictus* Esch. (1).
Pterostichus niger Schol. (4).
Pt. vulgaris L. (6).
Pt. nigrita F. (3).
Pt. madidus F. (3).
Anchomenus ruficornis Goez. (3).
Haliplus fulvus F. (9).
Dytiscus lapponicus Gyll. (8).
Agabus bipustulatus L. (40).
A. nebulosus Forst. (1).
A. arcticus Pk. (1).
A. guttatus Pk. (2).
Ilybius fuliginosus L. (1).
I. aenescens Th. (1).
Rhantus bistriatus Berg. (10).
Hydroporus griseostriatus DG.(1).
H. planus F. (4).
H. erythrocephalus L. (2).
H. piceus Stph. (*gyllenhali* Sch.) (1).
H. pubescens Gyll. (10).
H. palustris L. (5).
H. obscurus Stm. (4).
H. tristis Pk. (2).
H. melanocephalus Marsh (*morio* St.) (1).
Gyrinus minutus F., var. *kirbyi* Marsh (1).
G. natator L. (17).
Philydrus fuscipennis Th. (2).
Helophorus aquaticus L. (1).
H. aenipennis Th. (*viridicollis* Stph.) (1).
Atractelophorus brevipalpis Bd. (1).
Anacaena globulus Pk. (1).
Cercyon impressus Stm. (*haemorrhoidalis* Hb.) (1).
C. haemorrhoidalis F. (*flavipes* F.) (1).
C. melanocephalus L. (6).
C. unipunctatus L. (2).
C. lateralis Marsh. (1).
Creophilus maxillosus L. (4).
Staphylinus erythropterus L. (3).
Philonthus fuscipennis Man. (*politus* F.) (2).
Ph. mannerheimi Fauv. (*lucens* Er.) (1).
Ph. splendens F. (1).
Ph. laminatus Cr. (1).
Ph. aeneus Ross. (2).
Ph. varius Gyll. (1).
Ph. varians Pk. (1).
Quedionchus cinctus Pk. (1).
Quedius tristis Gr. (1).
Xantholinus glabratus Gr. (1).
Mycetoporus brunneus Marsh. (*lepidus* Gr.) (1).

Stenus similis Hbst. (1).
S. clavicornis Scop. (*speculator* Lac.) (1).
Aleochara curtula Goez. (*fuscipes* Gr.) (2).
Polystoma algarum Fauv. (1).
Drymoporus elongatus Gyll. (1).
Tachinus rufipes DG. (1).
T. marginellus F. (4).
Omalium rivulare Pk. (4).
Bessobia monticola Th. (1).
Chaetida longicornis Gr. (1).
Atheta crassicornis Fair. (1).
Datomicra arenicola Th. (1).
Necrophorus investigator Zt. (4).
Thanatophilus rugosus L. (6).
Phosphuga atrata L., var. *brunnea* Hb. (1).
Hister striola Sahlb. (*succicola* Th.) (2).
Saprinus semistriatus Scrib. (2).
Catops chrysomeloides Pz. (3).
C. fuscus Pz. (1).
C. morio F. (1).
Cryptophagus dentatus Hbst. (4).
Ptenidium nitidum Heer. (1).
Brachypterus urticae F. (10).
Epuraea depressus Gyll. (*aestiva* En.) (4).
Meligethes viridescens F. (4).
Enicmus histrio Joy (1).
Atomaria fuscata Sch. (1).
Laemophloeus minutus Ol. (*pusillus* Sch.) (1).
Ephistemus globulus Pk. (5).
Geotrupes stercorarius L. (3).
G. stercorosus Scrib. (*sylvaticus* Pz.) (4).
G. vernalis L. (1).
Aphodius rufipes L. (4).
A. depressus Kug. (1).
Dascillus cervinus L. (6).
Cyphon padi L. (1).
C. variabilis Thb. (5).
Rhagonycha lignosa Müll. (*pallida* F.) (1).
Athous hirtus Hbst. (*niger* Br. Cat.) (2).
Cryptohypnus riparius F. (1).
Dolopius marginatus L. (2).
Agriotes pallidulus Ill. (1).
Anobium striatum Ol. (*domesticum* Gf.) (1).
Platcaumaris discolor Pz. (3).
Phaedon tumidulus Gm. (3).
Chaetocnema hortensis Goef. (1).
Longitarsus luridus Scop. (5).
L. succineus Foud. (*laevis* All.) (3).
Crepidodera ferruginea Scop. (5).
C. transversa Marsh. (3).
Otiorrhynchus sulcatus F. (3).
O. singularis L. (*picipes* F.) (2).
Strophosomus melanogrammus Forst. (*coryli* F.) (1).
Philopedon plagiatus Schol. (*geminatus* F.) (1).
Sitona flavescens Marsh. (3).
S. tibialis Hbst. (5).
S. humeralis Steph. (3).
Cionus pulchellus Hbst. (3).
Micrelus ericae Gyll. (8).
Phytobius quadrituberculatis F. (1).
Ceuthorrhynchus rugulosus Hbst. (1).
Phytonomus nigrirostris F. (1).
Ph. rumicis L. (1).
Orchestes salicis L. (1).
Orobitis cyaneus L. (1).
Apion viciae Pk. (3).
A. apricans Hbst. (3).
A. loti Kirb. (2).
A. violaceum Kirb. (6).
A. frumentarium Pk. (9).

HYMENOPTERA.

Allantus arcuatus Först. (5).
Athalia rosae L. (1).
Nematus fulvipes Fall. (1).
Myrmica scabrinodis Nyl. (1).
M. ruginodis Nyl. (2).
Acanthomyops flavus F. (4).

(The Bees and Wasps are to form the subject of a paper by Mr. A. R. Waterson, B.Sc.)

APHANIPTERA.

Hystrichopsylla talpae Curt. (1).
Pulex irritans L. (no specimen preserved!).

DIPTERA.

Chironomus plumosus Deg. (5).
Ch. dispar Mg. (1).
Limnophilus meigeni Verr. (1).
L. fuscipennis Mg. (1).
Erioptera trivialis Mg. (1).
E. taeniota Mg. (1).
Molophilus appendiculatus Staeg.? (1).
Tipula scripta Mg. (1).
T. oleracea L. (2).
Tabanus tropicus L. (1).
Haematopota pluvialis L. (3).
Symphoromyia crassicornis Pz. (1).
Chrysopilus cristatus F. (2).
Trichina clavipes Mg. (1).
Empis tessellata F. (1).
E. vernalis Mg. (1).
E. trigramma Mg. (12).
Hybos culiciformis F. (3).
Dolichopus trivialis Hal. (4).
D. simplex Mg. (2).
D. urbanus Mg. (1).
D. plumipes Scop. (2).
D. ungulatus L. (1).
Hercostomus nigripennis Fln. (1).
Chrysogaster hirtella Lw. (4).
Sphaerophoria menthastri L. (var. *picta* Mg.) (3).
Melanostoma mellinum L. (4).
Platycheirus manicatus Mg. (1).
P. immarginatus Ztt. (1).
P. clypeatus Mg. (2).
Volucella bombylans L. (2).
Eristalis tenax L. (1).
E. horticola Deg. (1).
E. intricarius L. (1).
Helophilus hybridus Lw. (1).
H. pendulus L. (1).
Sericomyia borealis Eln. (3).
S. lappona L. (1).
Sepsis cynipsea L. (1).
Sapromyza obsoleta Fln. (1).
S. rorida Fln. (1).
S. pallidiventris Fln. (1).
Palloptera ambusta Mg. (1).
Urophora solstitialis L. (2).
Tephritis vespertina Lw. (1).
Psila atra Mg. (1).
Tetanocera unicolor Lw. (1).
T. laevifrons Lw. (1).
T. elata F. (4).
Actora aestuum Mg. (1).
Blepharoptera modesta Mg. (1).
Fucomyia frigida Fln. (1).
Coelopa pilipes Hal. (9).
Pogonota hircus Ztt. (1).
Scatophaga stercoraria L. (3).
Mydaea impuncta Fln. (1).
Spilogaster (*Helina*) *quadrum* F. (4).
S. nebulosa Stein. (2).
S. dispar Fln. (1).
Myiospila meditabunda F. (1).
Hydrotaea irritans Fln. (9).
H. dentipes F. (1).
H. similis Mde. (1).
Limnophora litorea Fln. (1).
Hylemyia seticrura Rnd. (2).
H. cinerella Mg. (2).
H. strigosa F. (1).
Phorbia exigua Mde. ? (1).
Euphoria cornicina F. (3).
Pollenia rudis F. (3).
Calliphora erythrocephala Mg. (5).
Lucilia sericata Mg. (2).
L. caesar L. (6).
Phormia terra-novae Rnd. (11).
Sarcophaga haemorrhoa Mg. ? (1).
Dexia rustica F. (2).
D. vacua Fln. (2).
Bothria caesifrons Mcq. ? (1).
Loewia setibarbia Egg. ? (1).
Thelaira leucozona Pz. (1).

Other Terrestrial Arthropoda from Eigg.

Acarina.

Bdella sp. ?
Ixodes ricinus L.

Phalangidea.

Liobunum rotundatum Latr.
Phalangium opilio L.
Nemastoma lugubre Müll.

Araneida.

Xysticus cristatus Clk.
Clubiona pallidula Clk.
Oedothorax fuscus Bl.
Lycosa pullata Clk.
L. amentata Clk.
Zilla x-notata Clk. (*litterata*).
Meta segmentata Clk.
Tetragnatha solandii Clk.
Araneus (*Epeira*) *diadematus* Clk.

Isopoda.

Ligia oceanica L.
Trichoniscus pusillus Brndt.
Oniscus asellus L.
Porcellio pictus Brndt. & Rtz.
P. scaber Latr.
Armadillidium vulgare Latr.
Philoscia muscorum Scop.

Diplopoda.

Iulus terrestris L.

Chilopoda.

Lithobius forficatus L.
Geophilus longicornis Leach. ?

Limenitis camilla in Hertfordshire.—The White Admiral is now very plentiful in a large wood in East Herts, where it was first seen in 1933. Mr. Frohawk, in his *Complete Book of British Butterflies*, says that the only flowers which appear attractive to this species are those of the bramble, and occasionally the thistle, but on any fine day in July this year I could always count on seeing several on a tall clump of Cow Parsnip (*Heracleum sphondylium*) growing in a moist spot on the banks of a stream, and sometimes there were as many as three on one flower-head. I saw two specimens of ab. *nigrina*—the first on July 22 was very worn and, not having a net with me, I did not catch it; but the second one, which is only slightly torn, I captured on July 30.—Miss B. A. Thorn; Heathcroft, Hertford Heath, Herts, September, 1941.

Chaerocampa nerii at Brighton.—I had cut down a large quantity of *Polygonum baldschuanicum* growing very thickly (of two or three years' growth) over a corrugated roofed shed the previous day and I deposited the whole of the foliage and dead leaves in centre of garden. Wednesday afternoon, September 24, 1941, about 4.30 p.m. I set light to it, and within a few minutes a large moth crawled up hurriedly, apparently from the centre of the smoking fire, fluttering its wings. I put my finger out for it to crawl on to, only seeing its head come up before it crawled on my finger. I thought it a Death's Head, but as soon as its wings became revealed, I was surprised to see it was an Oleander Hawk moth and a very perfect specimen. It is now in the Booth Museum, Brighton.—(Dr.) A. H. Pickett; 32, Chatsworth Road, Brighton, September 29, 1941.

ON REARING LEPIDOPTERA.

By Frank Littlewood.

(Continued from p. 235).

In the middle of the floor of the cage stands a shallow dish, and in it is placed a lump of soft mossy peat which has previously been soaked in water. Peat is very absorbent, and a little water poured on to it once a week suffices to keep it moist. (Wet sphagnum moss or even wet silver sand would do equally well.)

The slow evaporation from the peat, regulated by the scheme of ventilation, keeps the *air* in the cage humid. There is no need, with the great majority of pupae, for anything more elaborate or more drastic in the matter of damping ; and as a a general rule it is quite unnecessary, and even may be unwise, to allow pupae to lie for any length of time actually in contact with damp earth or damp moss. (The question of the function of damp in the pupa-cage is more fully discussed later on.)

Crippling from this cause, namely, a too dry atmosphere during the first few hours, is not infrequent among the Bombycids and Geometrids ; but this trouble may be minimized, if not indeed eliminated, by the very simple method of damping the *air* of the cage above described.

If, however, larvae have been allowed to bury themselves in ordinary garden soil—which, by the way, is a most unsuitable material, for after having been damped it is apt to dry as hard almost as cement—the cocoons themselves will require to be damped at the time of emergence, otherwise the moths will never be able to break through ; but it is safer to open the cocoons and treat the pupae as " bare." By far the best pupating compost is one made with granulated peat mixed with a proportion of silver sand. It is free from hard lumps, stones, and vermin, and cocoons are friable enough to permit the easy escape of the moths.

The object of a surrounding damp air in the pupa-cage is, it seems to me, not to supply moisture for the pupa to absorb, but rather to provide a condition which makes it less likely for the pupa to lose, by evaporation or some similar process, the normal fluid part of its tissues. For even when the imago is formed up, there is still a certain amount of fluid in or around it, inside the pupal envelope ; and it is the loss of this natural moisture by evaporation that either causes the pupa to dry up altogether and die, or prevents the imago from extricating itself completely from the shell.

And even when the moth has quitted the shell, a dry indoor air, and particularly *currents* of air, as may obtain in the usual type of

ventilated cage, may cause a too rapid evaporation from the soft unfilled wings, and in extreme cases may prevent their filling at all, or may harden the tissues prematurely before the wings have completely expanded.

Similar argument may explain the fact that pupae which are kept in airtight or nearly airtight tins, as in winter storage, do *not* dry up, even though not provided with extraneous moisture. In the case of plants, it is found that transpiration—which is a process closely related to evaporation—is very materially reduced when the surrounding air is still, and also when it is cold. And the combination of these two conditions will retard evaporation as effectually as will a surrounding saturated atmosphere. It is just this combination of the two important factors restraining evaporation that makes the winter storage of pupae in small closed tins so successful. And that stagnation, that is, the absence of moving air, is as important a factor as coolness is proved by the exemplary behaviour of pupae under the "all-dry" method—an alternative treatment I shall describe later on.

The floor of the pupa-cage is kept as bare as possible. Nothing is gained by covering the whole of the bottom of the box with damp soil and layers of moss, as is almost universally recommended. The less we provide in the way of "retreats" the better. Most Noctuids will hide themselves in the moss as soon as they are dry, and are then easily overlooked, or have to be hunted for; and they are almost certain to rub the scales off the thorax by burrowing under the moss. Moreover, it is difficult to keep proper stock of one's pupae when they are thrown into the cage in a haphazard fashion, and the smaller kinds are easily lost among the moss. My pupae are arranged as far as possible in their kinds in shallow trays, which are easily lifted out for examination. Each tray bears a label with the kind and the number of pupae it holds. Some such system is essential if one is to know the percentage of emergences from any particular batch of pupae. The trays are arranged all round the sides of the cage, leaving the centre bare for the damping apparatus. These little trays are made by tacking a strip of perforated zinc, 1½ in. wide, round the edges of a small piece of rough wood. They are of various convenient sizes.

Cocoons, if intact, are placed side by side in the tray and require no covering. The walls of the cocoon afford ample purchase to the insect in its first struggle to free itself from the pupal shell. Cocoons that have been partly broken, as will inevitably happen when they have been removed from the sides of the pots or cages, are placed open side down on the bare rough wood of the tray; and these, again, being protected by the cocoon, require no further covering. Pupae which drop out of their cocoons are treated as bare pupae.

Treatment of "Bare" Pupae.

The problem of how to treat bare pupae in the pupa-cage for long baffled me, but is at last happily solved. Several more or less conflicting requirements have to be met. In the first place, a bare pupa cannot safely be allowed to lie perfectly bare and uncovered in the pupa-cage. If that is done, it is extremely likely to be bespattered and contaminated by the fluid evacuations of moths that have already emerged. Most lepidoptera, immediately on or soon after emergence, and especially if disturbed (as when the attempt is made to box or bottle them), discharge a considerable amount of fluid matter, which, if it happens to fall on a bare pupa, will dry on it, clog its spiracles, and most probably kill it. Something therefore in the nature of a protective top covering is required.

Secondly, some artificial foothold is needed to assist the imago as it struggles to free itself from the pupal shell. The lack of suitable purchase at this critical stage is, I believe, the cause of a large proportion of cripples. In a state of nature the firm surrounding earth provides the needful resistance for a bare pupa, while the walls of the cocoon fulfil the same function for pupae that are so provided.

Furthermore, any artificial aid we offer, while it must act as an effectual protection against overhead danger and afford the necessary assistance to speedy and successful escape from the pupal integument, must be so adjusted as not to *press* upon the pupa. Pupae object to pressure; they are not accustomed to it. Those that are enclosed in cocoons, of no matter what pattern, obviously lie free and clean; while those that we term bare yet lie clean and clear in the cavity that the larva has prepared previous to ecdysis. In some cases (e. g. *A. atropos*) the cell is comparatively large and roomy, and is formed by the deliberate movements of the larva; in others (e. g. *S. ligustri*) it is a more constricted domicile, moulded only by the shape of the larva as it lies quiescent previous to its change. But even in the latter case—where the larva does not actually construct a cell, but merely lies in the earth—the pupa has still a little "elbow-room," due to the fact that the size of the cavity it occupies is at least as great as was the bulk of the newly-buried larva; its walls were moulded then and do not subsequently contract as the larva shrinks in size preparatory to pupating. Therefore a bare pupa, before we disturb it, is not only unsoiled by adherent particles of earth, but is also unhampered by either top or lateral pressure.

So that to cover these bare pupae with loose earth or sand, or even to pack them between or beneath layers of moss, is theoreti-

cally wrong, and, practically, is a treatment that helps to swell the number of cripples.

Shredded moss—to take the more usual treatment and certainly the lesser evil of the two—is yet far from satisfactory. To be effectual as a top protection it must be packed tolerably close and thick, which means not only a constant pressure on the pupae, but also a more or less impenetrable barrier to the emerging moths, which have to waste time and strength and scales in forcing a passage through the entangling strands before they are able to concentrate on the important task of drying their wings. A strong Sphingid may have but little difficulty in getting through, but a weak Geometrid may be hopelessly beaten.

And even when the moss has been most carefully arranged to avoid undue pressure there is no guarantee that the pupae will stay where they have been placed; often they wriggle deeper down and worsen their position. Moveover, when packed among moss very small pupae are as good as lost. It is impossible to examine or count them, and one can never be certain that the last of a batch has emerged, or what stock of pupae the cage at any time holds.

Such are the main factors of the problem; now for the solution.

I make for each individual bare pupa an artificial cocoon, in the form of a little cylinder of cloth. Broad cotton tape is suitable for small or average size pupae, and similar linen material, cleaned of its dressing and cut to proper size, for the larger kinds. One of my friends aptly dubbed these artificial cocoons "jackets," and the name was promptly adopted. These jackets are made by wrapping the end of a length of tape of, say, 1 in. width round the end of a pencil or fountain-pen, or any similar round implement, securing the overlap with a small pin, and clipping off the little cylinder thus formed with the scissors. The tape or other material selected should be stiff enough to preserve its shape when the pencil is withdrawn. The jackets are then fastened, each with a small pin through one side, along a narrow strip of wood. A strip of cardboard, nailed to the edge of the wood, covers the rear ends of the jackets and prevents the pupae from slipping through. The open front ends need to be slightly elevated to keep the pupae from falling out when the cage is moved. Two tiny tacks in the underside of the front edge of the wood will give it the necessary tilt. A dozen or more jackets may conveniently be attached to each wood strip, and the strips stand anywhere on the floor of the cage, but preferably facing the sides.

The bare pupae are carefully placed in the jacket, one in each, with the aid of a small spoon, and are, of course, put in tail first. The jacket is in every case sufficiently roomy to allow the pupa to move freely should it want to do so. At any time a strip may be

lifted out of the cage, the pupae examined and counted, and empty shells removed with the forceps.

These jackets not only protect the enclosed pupae from all overhead danger, but also provide the requisite purchase for the feet of the emerging insect.

Jackets are certainly a little trouble to make, but it is a job that can be done in the slack months, and once made they last for ever. The greatly increased proportion of successful emergences has fully repaid the trouble expended on their preparation.

The bigger jackets of the Sphingids are simply pinned to the wood floor of the cage, by a pin through the rear end of the jacket.

During the season the pupa-cage is kept indoors in my sitting-room. It stands on the floor in a corner away from the fire and where the sun cannot shine on it. Indoors, like this, it is always accessible, which is an advantage when one requires to examine it perhaps several times a day. Here, too, it is less exposed to the attacks of vermin. Mice, slugs, earwigs, ants, and the larvae of certain Micro moths, are all sworn enemies of pupae. So that, if the pupa-cage must be kept out-of-doors, say in an outhouse, it is necessary to protect it from these marauders. A well-built meat safe, of the cupboard type, to enclose the pupa-cage will make it doubly secure; but it is much more convenient to have the cage indoors, though possibly better in a fireless room.

That I have a fire in the room on cold days does, however, not appear to affect the behaviour of the pupae materially; probably the low position of the cage will prevent the temperature inside it being raised more than a very few degrees. At any rate, the pupae never seem to be even slightly forced by their sheltered condition, and I have frequently seen species on the wing outside days before the same kinds have begun to emerge in the cage.

In this rather damp and enclosed cage the insects take a little longer to dry than in one that is open and airy, so that I usually postpone killing operations till late in the day, when it is rare indeed to find the wings not thoroughly hardened. It is, of course, a fatal mistake to kill a specimen while its wings are limp. An insect so hurried will be difficult if not impossible to set, as the soft wings crease and fold as they are being pushed up, and—which is even worse—bleed under the pressure of the brace, and stick to it.

I have found it a good plan, when a large moth (e. g. a Sphingid) is drying, to prop open the lid of the cage for an hour or so, to allow a through draught of air. Smaller moths, which have emerged early in the day or through the previous night, are pill-boxed as soon as they appear dry and left alive in the pillbox with lid ajar till evening.

The males of many moths, particularly Bombycids and Notodonts, are often restless as soon as they have dried, and cannot be left alive overnight. The females, on the other hand, are usually quiet until they have paired. As a general rule I kill everything that is ready for it in the evening, before they begin to fly. Troublesome exceptions are species such as *P. tremula*, *B. betularia*, etc., which have a stupid habit of emerging from 9 p.m. to 11 p.m., and are rarely dry enough to be killed before one retires for the night and yet, if left alive, the males, at least, may be quite useless as cabinet specimens by morning. It is possible however to combat the activities of these untimely emergers by removing the pupa-cage to a cool room for the night. Even such noisy kinds as the Notodonts will often sit still all night if the temperature is rather low. Heat makes the males very skittish and unruly.

P. pedaria, *L. hirtaria*, and the winter species generally, emerge better and seem less likely to cripple if the pupa-cage is kept in a cool place, not really any warmer than the normal outdoor temperature. They do not respond well to any forcing treatment, and if they do not actually dry up under it the male moths often fail to develop their wings. With these kinds wing expansion may be delayed for many hours if the weather is cold, but they are so sluggish that they may safely be left in the cage for a day or two if necessary. Orthosiids, too, emerging in cold weather, will often sit about for hours without making any attempt to dry their wings. Moreover, they are able to do it quite successfully on the floor of the cage, and do not appear to require to hang down from the lid or the sides of the cage. These early moths must be looked after in good time, and the pupae placed in a suitable cage; only last year I found *O. incerta* beginning to emerge in the third week of December, and this from pupae stored in the cold cellar.

Skittish Geometrids, such as *T. dubitata*, or equally active Noctuids, such as *P. porphyria*, are troublesome to box or bottle, especially if several have emerged together. For as soon as the lid of the cage is raised they are up and away, and may easily escape. To frustrate them I drape a piece of black net around the open ends of the lid and over part of the front, just leaving enough open to admit the hands. The net is attached around the cage by drawing-pins, and the lid propped open by a wooden leg.

Pupae that have been dug in damp weather, especially from a clay soil, will frequently be smeared with wet soil which, if allowed to dry on them, will undoubtedly kill them. Each pupa may be gently sponged with a scrap of soft sponge, or may be rinsed under the cold tap for a few moments, before being packed away. After the washing they may be allowed to lie on blotting-paper for a little while to permit the moisture to evaporate.

(To be concluded.)

NOTES AND OBSERVATIONS.

HERSE CONVOLVULI.—I took a male *S. convolvuli* at rest on a post on the cliffs at Exmouth, Devon, on July 6.—F. H. LYON; 22, Murray Road, Northwood, Middlesex, September 5, 1941.

ACHERONTIA ATROPOS L. IN GLOUCESTERSHIRE.—Mr. Ronald H. Curtis of the Laurels, Longford, near Gloucester, at the suggestion of Mrs. Pearce Ellis of Longford Court has brought me this evening a full-fed larva of the Death's Head Hawk moth found amongst his potato plants. The last occasion on which the species arrived was on September 20, 1938, when Mr. W. Hemming found the pupa in the same district, the moth emerging on October 20 following. That was an earlier season.—C. GRANVILLE CLUTTERBUCK, F.R.E.S.; 23, Heathville Road, Gloucester, September 25, 1941.

CATOCALA NUPTA L. IN NORTH WALES.—On September 6 a *Catocala nupta* L. flew off the trunk of an oak on the left bank of the Severn near Newtown, Montgomeryshire, as my husband and I approached. It was in full view of us both for about eight seconds. On September 24 I found a female of this species at rest on an oak within a few hundred yards of the same place. It was on the north side, about 3 ft. from the ground. Though kept in suitable conditions for a week and well fed it laid no eggs. The wing expanse is 82 mm.—ELSIE K. ALLAN.

ORIA MUSCULOSA DURING 1941.—This insect was very late in its appearance in the Salisbury area this season. In fact when several visitors found it not forthcoming at the beginning of August, it was feared that it might be a bad year for this Wainscot, especially as a thorough search for the larvae in June and July failed to reveal any in fields where it had appeared in previous seasons. However, on August 12 a few were taken flying out of wheat which was being cut, while two days later a large number were obtained in the same way on ground where it had turned up in 1940. So far as I know, none others were caught, chiefly owing to the inclement conditions prevailing at this period. It is to be hoped that further investigation next year may at last solve the problem of its life-history.—C. G. M. DE WORMS; Salisbury, October, 1941.

ORIA MUSCULOSA IN HAMPSHIRE.—On August 21 I took one female *musculosa* in an oat field at Micheldever. No more were seen during a stay of about an hour. It flew up from the stubble several minutes after the binder had passed. At Salisbury on the 14th inst. I found that this appeared to be their habit, and that to follow close behind the binder was both tiring and unproductive. While watching one flying amongst the corn I noticed that as soon as it alighted on a corn stalk it at once ran swiftly backwards to within about 3 in. from the ground. Each time I disturbed it the procedure was the same. Once previously, in July, 1933, I took a male at light here.—C. H. DIXON; Northbrook Farm, Micheldever, August 23, 1941.

RHYACIA SIMULANS IN SALISBURY.—On September 7 I noticed a moth on a wall near my bedroom, and to my surprise it turned out to be a fine specimen of the Dotted Rustic, which Mr. C. R. Pitman tells me has not been recorded before from the vicinity of Salisbury. The nearest it has been taken is at Chute in the Andover district by the Rev. W. Freer, who obtained two specimens in his garden on Valerian, to which it is very partial. It would seem that this species, like its near relative *Spaelotis ravida*, likes to hide in buildings. At Portland, where it is occasionally fairly common, the best means of obtaining this elusive insect is to put down sacks at intervals along the cliff and look underneath the next day. Mr. R. P. Demuth secured a fine series by this method.—C. G. M. DE WORMS; 12, Harcourt Terrace, Salisbury, September, 1941.

HELIOTHIS PELTIGERA IN S. WALES.—This morning a Bordered Straw moth (*Heliothis peltigera*) emerged in my breeding-box. It was reared from one of three larvae which I found early in August, feeding on marigold flower-heads in my garden.—C. H. TAIT; Morningside, Newton, Swansea, September 4, 1941.

VARIETIES OF XANTHORRHOË MONTANATA AND PERIZOMA AFFINITATA.—So long ago as 1906 my friend, Mr. George Holmes, netted an uncommon looking Geometer in a little swampy hollow close to the town of Kendal. I was collecting with him at the time and vividly recall the perplexity with which we both viewed his capture. At first it was put down as a variety of *Xanthorhoë rivata*. Later on we called it an extreme form of *X. sociata*. Just recently I was able to see this specimen again and decided that it was high time to take further advice. It was as well I did so, for both of our early guesses prove to have been wide of the mark. I sent it, along with one of my own "doubtfuls," to the British Museum, with an appeal for an expert judgment, and received the following kind and prompt reply from Mr. Riley: "I took your two Geometers to show to Mr. Prout. He was very interested in them. He finally came to the conclusion that the supposed *sociata* was, in fact, a very remarkable variety of *Xanthorhoë montanata*, only approached by some of the specimens from the Shetlands. The other one is, as you suspected, a melanic *Perizoma affinitata*. There is a solitary, almost exactly similar specimen in the Rothschild Collection labelled 'Hawksworth'." Superficially, this strange *X. montanata* is like the figure of *X. sociata* var. *obscurata* (South, vol. ii, pl. 81, fig. 9, *Moths of the British Isles*), but there are some important points of difference. It is decidedly bigger; the brown shadings are uniformly pale fawn colour; the first line is bent; the white lines are the creamy white of *X. montanata*; the whiter thorax and abdomen seem to me (now) definitely *X. montanata*; the disc of the hind wing is a clearer white. *X. montanata* does exhibit a considerable range of variation in the Kendal district, but I have never seen one anything like this. It is a very pretty moth and in good condition. The melanic *P. affinitata* came into my own moth-trap a few years ago. It is almost unicolorous, and being rather worn is perhaps more interesting than attractive.

It may be as well to put on record two further Kendal varieties. The first is a form of *Pieris brassicae* that does not appear to have been described. In 1910 Mr. Holmes bred four males of this species, having a distinct linear black mark close to and parallel with the outermost curve of the hind margin of each hind wing. In the best example the length of this mark is about a quarter of an inch. The second is represented by two specimens of *Callimorpha jacobaeae*, bred by Mr. James Smith of Kendal. They are of normal appearance except for the absence of the upper hind-marginal red spot on both fore wings. I gather from Barrett and South that variation in this species is unusual.—FRANK LITTLEWOOD ; 34, Aynam Road, Kendal, Westmorland, October 2, 1941.

COENOTEPHRIA SAGITTATA AT WICKEN.—During a visit to Wicken Fen in August, 1939, I took one nearly full-grown larva of *C. sagittata* after a morning's careful search of the Meadow Rue. This pupated and emerged on June 16 in the following year. I mention this as I am told it has not been seen at Wicken for some years past.—(Rev.) WALTER L. FREER ; Chute, Wilts.

REARING LEPIDOPTERA.—The most interesting and instructive article by Mr. Frank Littlewood continues to be read with the greatest pleasure, and in response to his suggestion (*Entom.*, **74** : 205) I send a note of my experiences in breeding *Arctia villica*. I have successfully bred a large number of this insect from the ova, and the only occasion when I failed to get them through was when I departed from my original and subsequently successful plan. Of all the hibernating "Tigers," *A. villica* seems to feed up fairly quickly in the early stages, and consequently can be placed in a large cage earlier than most of this group. I bred some fifty successfully in 1929 by placing them in a rough wooden box (12 in. by 6 in. by 4 in.) with a perforated zinc lid. They were given a mixed diet of groundsel and dandelion as long as they would feed, and from September onwards were kept on the window-ledge of a bedroom facing north, with a west window adjoining the north one. The bottom of the box contained about an inch of sandy peat fibre. During the winter they were occasionally sprayed lightly with a nasal syringe containing lukewarm water. Practically all fed up to maturity in the spring and emerged successfully, although I lost some owing to the cocoons being bunched together. The bedroom in question has a small hot-water radiator which maintains a more or less even temperature, although in very cold weather the north aspect reduces the temperature very considerably. I rather emphasize this point, as I have an idea that hibernating Tigers do not like sudden changes of temperature. That they can stand up to frost is well proved by the abundance of *Diacrisia sannio* and *A. villica* in some of the East Dorset valleys, which are certainly not frost-free. My experience with *Euplagia quadripunctaria* is quite different. I have twice tried to breed this insect but have failed. I have invariably lost those that survived the winter, just when they should have started to feed again. Most of my losses

were through "drying up" during hibernation. Having received some ova from Devon this year I am trying again, and will record my experience later. As an individual who has ruined quite a number of perfectly good canvasses in the past, and has also suffered more than most, at the hands of a dentist, I am still wondering what Mr. Littlewood's "palate" knife looks like.—A. GRANVILLE WHITE; Hill Top House, Chaldon, Surrey.

SYMPETRUM FONSCOLOMBII IN WIMBLEDON.—There is some very swampy ground up on Wimbledon Common with quite deep water in one or two places surrounded by birch trees and heather. Here, on several occasions, I saw *Sympetrum fonscolombii*. I saw and caught the first pair in the first week in August, after which I saw quite a number more until the second week in September. Altogether I caught five males and three females during this period. I could not tell how many I saw and did not catch because there were many *Sympetrum sanguineum* there as well, but I know it was quite a number. I also caught one *Libellula quadrimaculata* in the third week in August at the same place. I have to thank Mr. Kimmins for checking my identification of *S. fonscolombii*.—JOHN A. RILEY; 7, McKay Road Wimbledon, S.W. 20.

DRAGONFLIES CAUGHT BY SUNDEW.—With regard to Mr. C. J. Paton's remarks on this subject in the September issue of the *Entomologist*, I see from my notes that in July, 1936, I observed a pair of *Pyrrhosoma nymphula* in cop. on the island of Hoy (Orkney Isles). The male was firmly caught by its hind wings in the grip of a Sundew (I believe *rotundifolia*, although I unfortunately omitted to make a note of the species at the time). It must be a very rare occurrence for a dragonfly to be trapped in this manner, and evidently depends on the chance of the insect settling on *Drosera* for a protracted period. Zygopterids up to the size of *Erythromma naias* are not uncommonly to be seen entangled in spiders' webs.—E. T. DANIELS (Tpr.); 334, Dereham Road, Norwich.

AN INVASION OF LADYBIRDS AT BOURNEMOUTH.—Miss C. Bryan, of 86, Overcliff Drive, Southbourne, reports that at 11 a.m. on August 3 swarms of Ladybirds came in from the sea and settled over a front of ten houses. The wind was S.W. and they were probably merely windborne. The species was not identified at the time, but Lt.-Col. F. C. Fraser reports that the two species there then were *Coccinella bipunctata* and *C. 7-punctata*, with the former in great preponderance. —T. DANNREUTHER; Windycroft, Hastings.

LIBELLULA DEPRESSA L.—This species has not been common in the Bournemouth district for some years, but on July 10, 1941, appeared in dozens, of which 6 were taken, both teneral and adult and of both sexes. They were flying in forest mainly, but with numerous males in flight over ponds in warm sun where they had not previously been recorded. Their sudden appearance seems to have been due to an immigration.—Lt.-Col. F. C. FRASER; 55, Glenferness Avenue, Winton, Bournemouth.

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THE FOOD AND WATER REQUIREMENTS OF *GIBBIUM PSYLLOIDES* CZEMP (COLEOPT., PTINIDAE), WITH SOME NOTES ON ITS BIOLOGY.

BY N. E. HICKIN, PH.D., F.R.E.S.

THIS species has long been known (under the synonym *Gibbium scotias* Fab.) to infest old houses, stored seeds, etc. Stephens in 1839 mentions it as occurring in London, Bristol, and Newcastle-on-Tyne in old houses. During the past few years it has been recorded from several types of vegetable material. Seeds, grain, and grain products are the materials most commonly infested, but in addition to these it has been found in various types of vegetable debris (debris of haystacks, warehouse sweepings). Woollen materials have been damaged by this species, and paper, opium cake, and a sponge rubber mat (1) have also been recorded as suffering damage by infestation. The record of the sponge rubber mat being damaged is rather curious, as this appears to be the only observation made of a rubber article being damaged by insects in a temperate climate. In attacking opium cake *Gibbium psylloides* shares the ability of subsisting on "drugs" with the other Ptinids. Tallow has also been given as a foodstuff.

An interesting point concerning this species is that it has been recovered from dried resin found in an ancient Egyptian tomb, where it had been infesting some material approximately 3500 years ago.(2)

Gibbium psylloides is easily distinguished from other Ptinids by the blood-red colour of its curved globular and glabrous elytra. The ventral surface of the abdomen is extremely small, the dorsal surface is large and distended, but leaves an air-space between the latter and the elytra. The ventral surface of the abdomen is covered with characteristic branched hairs.

Kemper (1) has given an account of the biology of *Gibbium psylloides*, and concludes that in many respects it is similar to *Niptus hololeucus*.

It is a much less active beetle than *Ptinus tectus* Boieldieu, its usual walking gait being very slow and rather cumbersome. The adults feign death when disturbed, but for a few seconds only and then awkwardly scuttle away. When feigning death the antennae are held along the ventral surface of the thorax and abdomen whilst the legs are held loosely bent together. Seven virgin females

reared from sexed pupae were confined in a culture cage with plain flour until their death, but no eggs were laid. The adult does not readily burrow into soft foodstuff, but hides in crevices and appears to spend a great amount of time wandering aimlessly about. The adult is comparatively long lived; several females lived 18–21 weeks at 20° C. with food absent, but in the presence of free water.

Coition takes place at frequent intervals during the life of the adults, and was once observed to take place on one occasion three months after the initial act. Coition took from three to eleven minutes, and on account of the small abdomen and large overhanging elytra the male takes up a position at right angles to the female. The eggs are similar in shape and size to those of *Ptinus tectus* and, as in this latter species, relatively few eggs are laid.

The larvae are typical Ptinids. They differ in habit from the larvae of *Ptinus tectus*, however, in not wandering when seeking a position for the cocoon. In the rearing experiments carried out with this species no larva was observed on the surface of the food-stuff when fully fed, as was often the case with *Ptinus tectus*. The cocoon is spherical and a wide variation in wall thickness was found. The pupa is at first white, but before emergence of the adult it turns golden brown. It is extremely difficult to extract the pupa from the cocoon without injuring it. Sexual differentiation of the pupae can be carried out quite easily. 64 adults obtained from the rearing experiments described below were sexed by examining the genitalia; there were 33 males and 31 females. There was great variation between different cultures, but the numbers were always very small.

Life history.—The initial stock of *G. psylloides* was provided by the Imperial College Biological Field Station, through the kindness of Dr. O. W. Richards. The food-stuffs used (3) and the methods employed (4) have been described elsewhere. It was found that sexing pupae killed or crippled many of them. Pairs were therefore obtained by placing together specimens reared from segregated cocoons and removing the couples as they were seen to pair. Each pair was placed on one of the four food-stuffs, plain flour, wholemeal flour, rice flour or casein, in equilibrium with a particular relative humidity. The culture cages were kept in appropriate humidity chambers at 27° C. The oviposition of the pairs was in general poor and only about 50 adults of the second generation were reared in all. The figures are insufficient to indicate the effects of humidity and food-stuff on development. The following is a general summary of the results:

(1) Only one egg was laid at 10 per cent. or 20 per cent. RH. The larva died in the egg without emerging.

(2) At 30 per cent. RH. 14 eggs were laid and 11 hatched, but all the larvae subsequently died.

(3) At 40 per cent., 50 per cent. and 60 per cent. RH. the rates of oviposition and development appeared to be about the same on plain flour, wholemeal flour or rice flour. 46 per cent. of these larvae produced adults. No larvae developed on casein.

(4) The length of the life-cycle (emergence of parents to emergence of offspring) was usually between 25 and 30 weeks (extremes 22 and 42 weeks).

(5) Adults with food usually live 30–40 weeks.

(6) No eggs were laid at 70 per cent., 80 per cent. or 90 per cent. RH.

Without food the adult lives much longer if allowed to drink free water. Adults emerged 10–14 days previously were placed in culture cages without food at 30 per cent. and 70 per cent. RH., 20° C. In one set of cages were placed aluminium tubes ¼ in. by 1 in., filled with wet cotton-wool; the other set were not given water.

Results.

	Mean survival period. Weeks. ♂.	♀.
30 per cent. RH : Water present ..	9.1 .	11
Water absent ..	4 .	4
70 per cent. RH : Water present ..	13 .	16.6
Water absent ..	6 .	6

References.

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(2) Alfieri, A. (1931).—Les insectes de la tombe de Toutankhamon, *Bull. Soc. R. ent. Egypte*, fasc. **3–4** : 188–189. (*R.A.E.*, *A.*, **20** : 107.)

(3) Hickin, N. E. (1941).—*The Food and Water Requirements of* Ptinus tectus *Boield.* (In course of publication.)

(4) *Idem* (1941).—Methods Used in Rearing Small Insects Infesting Stored Food Products, *Proc. R. ent. Soc. Lond.* (*A*), **16** : 35–38, 4 figs.

Butterfly Tastes.—With regard to Mr. F. W. Frohawk's two letters on this subject (*Entom.*, **74** : 67, 236), I may add the example of *Limenitis camilla* imbibing human sweat. On July 12, 1941, I was examining *Aphantopus hyperantus* along the road outside Bagley Wood, when a somewhat battered *camilla* fluttered wearily out and was received in the net. On being removed therefrom, it remained for at least 10 minutes on my left hand, imbibing the sweat thereon. It took no notice of the movements of the net in my other hand, and finally flew somewhat uncertainly off, a minute and a half after stopping its feast.—J. F. D. Frazer; 1, Stanley Gardens, W. 11.

CONCERNING A BROOD OF *RHYACIA ORBONA* (*COMES*).

By A. M. Morley, M.A., O.B.E.

On September 28, 1938, Mr. R. C. Crewdson was good enough to present me with a considerable number of larvae recently hatched and all, he thought, the offspring of a "black" female taken at Forres. These larvae were kept in 3-in. glass-topped tin boxes and fed on dandelion leaves. The boxes were put in a dark cupboard adjoining a chimney, where the temperature remained at about 60° F. continuously. Unable to distinguish day from night the larvae fed up rapidly and grew to a large size. When ready for pupation they were transferred to a breeding-cage. The first transfer was made on October 14 and the last on November 8.

The first moth emerged on November 20 and for a time the insects appeared singly. Towards the end of the month two or three came out at a time, and on December 2 the number rose to 8. For the next ten days emergences continued steadily. Then came a blank period until December 16, when 6 appeared. After that there were 4 single emergences, the last on December 30. One of the moths that emerged on December 16 managed to escape. It was found on January 16, hiding in a curtain, and was still in good condition.

The insects fell into two well-defined groups—those with hind wings of normal colour, and those with hind wings having more than the usual amount of black.

In the first group there were two forms: (1) 15 were evidently typical in colour and showed little variation. The colour scheme, however, was in every case different from that of a series I bred from Rannoch larvae.

(2) 18 had fore wings of a peculiar slaty grey, a form that I have not met elsewhere. This form has, I believe, been described and named by Tutt, but I am not at present in a position to refer to his book.*

In the second group there were four forms, or, more properly, four degrees of melanism:

(1) 8 had fore wings of a rich red. This form is clearly *curtisii*.

(2) 6 had fore wings red in the costal area and otherwise black: evidently Tutt's *rufonigrescens*.

(3) 18 had black fore wings: Tutt's *nigrescens*.

(4) 2 had, in addition to black fore wings, hind wings so dark as to be almost black. This must be Tutt's *nigra*, or something like it.

* Apparently Tutt's *grisea*.—N. D. R.

The following summary shows the remarkable symmetry of the distribution:

Group A	1. Type	15		33.
	2. Grey	18		
Group B	1. *curtisii*	8	14	34.
	2. *rufo-nigrescens*	6		
	3. *nigrescens*	18	18	
	4. *nigra*	2		

County Education Office,
Springfield,
Maidstone.
August 29, 1941.

LIMENITIS CAMILLA IN 1941.—In the latter part of July I was cycling from here into Wiltshire, and on the way observed a number of White Admirals in the Woods near Petworth and also in the neighbourhood of Romsey. Later I found this butterfly in fair numbers in the Great Ridge Wood, near Wylie, where *Argynnis paphia* was to be seen in extraordinary profusion. It is quite likely that *Limenitis camilla* has always been there; but I do not myself remember ever finding this insect in the county of Wiltshire, where I used to collect as a boy. On August 4, in a wood near Bridge, Kent, I found a Buddleia bush growing wild. On and around it were *Limenitis camilla, Argynnis paphia, Vanessa cardui, Nymphalis io* and *Polygonia c-album*—a beautiful collection of apparently single specimens. As an example of the lateness of the season I have a record of *Argynnis paphia* still flying on August 24.—CECIL M. GUMMER; 31, Codrington Road, Ramsgate.

AUTUMN VANESSIDS AT OXTED, SURREY.—All the autumn Vanessids have been more than usually abundant this year, the star turn being the abundance of *Polygonia c-album*. This species first appeared here in odd specimens seven or eight years ago, and I have seen it each year on flowers in the garden until this year, but only in small numbers, say up to a dozen examples per annum. This year it has been comparatively abundant; on September 27 there were nine on the flowers, half a dozen of them on a clump of *Aster amellus* "King George." All the other Vanessids have been common, including *Vanessa cardui*. Some twenty-five years ago it was pretty abundant at Brockenhurst in the New Forest. Is it still there? In addition to the Vanessids, on September 27 there was a male of *Gonepteryx rhamni* on a truss of *Buddleia variabilis*. This is the latest date I remember seeing a specimen; it usually goes into hibernation towards the end of August.—W. G. SHELDON.

ON REARING LEPIDOPTERA.

By Frank Littlewood.

(Concluded from p. 260).

Method of Transferring a Large Moth from the Net Lining of the Cage Lid to the Killing Bottle.

A Sphingid or large Bombycid invariably selects the net roof of the cage when drying after emergence, and continues to cling tightly to it after drying. Many smaller moths hang similarly but are much easier to bottle as they quickly relinquish their hold when touched with the rim of the bottle. The big things, on the other hand, stick like grim death, and some careful manipulation is called for if they are to be bottled without injury to themselves, or without fouling either cage or killing-bottle with the copious thick fluid they evacuate the moment they are disturbed.

The lid of the cage is propped open by a simple folding leg, made by attaching a thin slip of wood to the front corner of the frame by a single screw.

A sheet of paper, rather bigger than the top of the cage, is then laid across the open top, to intercept the moth's evacuations. Before putting the bottle over the moth I disturb it and make it evacuate. Then, placing the bottle over it, I compel it to relinquish its strangle-hold of the net by slipping in between the bottle and net a flexible postcard. The moth protests with powerful flaps of its wings, but unable to find purchase for its feet on the advancing card it drops into the bottle, which is then withdrawn and corked.

The "All-Dry" Method: An Alternative Treatment.

This method of rearing pupae differs from the one previously outlined as the normal method only in what may be termed the final act, which calls for an entirely different pattern of pupa-cage. It is an unorthodox method, and, so far as I am aware, has never before been tried or recommended.

Instead of being ventilated and kept more or less damp, the emerging cage is now entirely closed in, so as to be practically airtight, and is perfectly dry.

The originality claimed for this method lies wholly in the *confined* dry atmosphere of the pupa-cage. Many, I know, keep their pupae dry during the winter months, and Greene was perhaps the first and only one to advocate keeping pupae dry throughout. In order to eliminate cripples in an all-dry system, it is essential that the atmosphere in which the moths emerge shall be not only

dry but *confined*. This is the whole point of my own method, and I believe it is one of supreme importance.

Whether every species, or even the majority, can stand this all-dry treatment is a question that only trial can answer. If they can, no treatment could be simpler, and the problem of damping could then be relegated to oblivion. But it is early to take up a positive attitude on so important a matter. Suffice it to say that my experiments in this direction have up to the present yielded almost wholly satisfactory results. Each season, as the opportunity offers, I test some fresh species, and so far I have very few failures to record. Nevertheless, the number of kinds I have been able to test, although fairly representative of the different groups, is but a small proportion of the complete list; and there is always the possibility of wider-reaching experiments discrediting the method. I am sanguine enough to believe that it will stand.

Rippon (*Entom.*, 1915, May–August), in that most useful article to which I have already referred, says definitely that unless the atmosphere of the pupa-cage is decidedly damp many cripples will be bred, especially among the Geometrids. Such I have myself found to be the case when the cage is of the usual ventilated type. But this argument does *not* apply when the air of the cage is confined and stagnant, as it is in this all-dry method I am describing. Already I have tested many species of Geometrids, and with but a single exception (*female H. pennaria*) they have developed perfectly, the secret of success lying, I am convinced, in the practically airtight condition of the dry emerging cage.

In this all-dry method the pupa-cage is a metal box—an empty biscuit tin, the size known in the trade as a "flat half-tin." It measures roughly 9½ in. by 9 in. by 5 in. The smooth inside (sides and bottom) are lined with white leno, pasted on, to provide a rough surface for the feet of the newly emerged insects. The ordinary tin lid is discarded, its place being taken by an easily constructed slip-on lid of framed glass. The underside of the glass has stretched over it a piece of black net, so that the insects can hang from it if they want to do so.

The pupae are arranged in trays or in jackets, as described before. Until they are put into the pupa-cage, which is only a week or two before their expected emergence, they receive exactly the same treatment as in the ordinary method, namely, dry cool storage in small tins.

No moisture is provided, and there is no ventilation. The only air the pupae have is that enclosed in the cage. This will, of course, be renewed each time the lid is taken off for the purpose of boxing a specimen, but the lid is never removed solely with the idea of renewing the air supply. Pupae require very little air, and no

harm appears to accrue if several, or even many, days elapse without fresh air being admitted.

A very useful modification of this all-dry method is the employment of the largest size glass-top metal box (3¼ in.), such as is commonly used for larva-rearing, for an emerging cage. Such a cage is amply big enough for any of the smaller Geometrids (Pugs, etc.), or for any odd pupae of other families that may require to be kept apart for the purpose of identification. An old tin with roughish inside is best for this job. The lid of the box is kept closed and no moisture is supplied. Any moth that emerges is easily seen without opening the box. Nine out of ten rest, when dry, on the inside of the lid, which is convenient, as they are easily and without much risk of escape transferred to the killing bottle or ammonia-jar. If the lid is carefully lifted off and sharply tapped against the rim of the open bottle, the moth will drop in; or if the lid is placed on the table, a small piece of blotting-paper, soaked in chloroform, may be slipped underneath and will quickly reduce the imprisoned moth to a condition that will allow it to be transferred to the ammonia-jar. For all these smaller species this is quite the handiest and safest pupa-cage. Since adopting it I have had no crippled "pugs."

One may keep these metal boxes inside the large pupa-cage, not because it is necessary but simply for convenience. They are less likely to be overlooked.

I don't think this all-dry method is suitable for forcing pupae, that is, in considerable heat. The most satisfactory results are obtained when the cage is kept in a normal temperature, say, that of a fireless indoor room.

I have, so far, reared the following by this method—a fairly representative lot:

Sphinx ligustri, Smerinthus populi, Chaerocampa elpenor, Lasiocampa callunae, Cosmotriche potatoria, Pheosia tremula, Notodonta ziczac, N. dromedarius, Odontosia carmelita, Lophopteryx camelina, Earias chlorana, Phragmatobia fuliginosa, Diacrisia sanio, Callimorpha dominula, Taeniocampa incerta, T. gothica, Pachnobia leucographa, Barathra brassicae, Mamestra persicariae, M. pisi, Cucullia asteris, Phlogophora meticulosa, Aplecta nebulosa, Acronycta psi, Plusia gamma, P. moneta, Amphipyra tragopogonis, Xanthia fulvago, X. lutea, Polia chi, Apamea gemina, Amathes lota, Triphosa dubitata, Eucosmia certata, Cidaria miata, C. truncata, C. fulvata, Eulype hastata, Xanthorhoe fluctuata, Thera juniperata, Pachys betularia, Acidalia aversata, A. bisetata, A. virgularia, Tephrosia punctularia, Xanthorhoe sociata, Anticlea badiata, A. nigrofasciata, Ennomos autumnaria, Gonodontis bidentata, Boarmia gemmaria, Angerona prunaria, Ennomos alniaria, Hemerophila abruptaria,

Himera pennaria (males only), *Eupithecia subfulvata*, *E. vulgata*, *E. absinthiata*; the only failure, so far, being the female of *Himera pennaria*, but they are notorious for crippling, even in a damp cage; indeed they need to be kept really damp if they are to develop properly; this is one of the few cases where it is advisable to spray the cocoons every day while the moths are emerging.

Among the butterflies I have tried, the following gave no trouble: *Pieris brassicae*, *P. napi*, *P. rapae*, *Eumenis semele*, *Pararge aegeria*, *P. megera*, *Epinephele tithonus*.

I have yet to try *Nonagria typhae*, and am inclined to anticipate failure. Years ago, when I bred this species, I decided it required a good deal of moisture in the pupa-cage; in a dry air the moths came out all right, but the wings never grew, but then I had not discovered the secret of the *confined* dry air. It may make all the difference.

The Forcing of Pupae.

Acceleration of the emergence of the perfect insect by the process known as "forcing" is a perfectly sound and advantageous practice if carried out in a proper manner, and with a full recognition of its limitations. For it must be realized that it is not possible to force every species; some resist it absolutely, and will die under the treatment.

Butterflies are stated to be bad subjects, but after all there are very few kinds of butterflies that anyone wants to force. Only a few pass the winter as chrysalids, but of these I have been successful with *Pieris brassicae*, *P. rapae*, *P. napi*, *Hamearis lucina*, *Thecla rubi*, *Celastrina argiolus*.

Experience has shown that the kinds of moths that respond most readily to the treatment are those over-winter species which naturally emerge in the early months of the year, up till, say, June. On the other hand, a moth such as *Eustroma reticulata*, which normally does not appear till July, is not at all affected by an increase in temperature earlier in the year. If it were, we should see it on the wing sometimes after a heat-wave in June, but we never do. Other kinds have a similar fixed habit, and all of these it is quite useless to attempt to force.

But there are plenty of species that may be hastened by forcing, during the later months of winter, and may then be set and cleared off the boards before the press of outdoor work begins, which is an advantage to a busy collector.

There is nothing to be gained by beginning forcing before the turn of the year; the pupae are all the better for having felt some, at least, of the winter's cold; but there does not seem to be any need to expose them to actual frost; the normal winter temperature of the cellar or larder is quite cold enough.

An elaborate cage or complicated damping arrangements are quite unnecessary. My own forcing-cage is made in the same way as the ordinary pupa-cage, which was described in detail under the heading of "Pupa-cage." But for this purpose I select a narrower box that will stand conveniently on the mantelpiece. The closed glass lid, the limited ventilation, and the method of damping, are all precisely as before.

The temperature ranges from 60° F. to 70° F., and this is quite warm enough for ordinary work. Under these conditions the moths begin to appear in about ten days, and may dribble out for many weeks. Nothing is more surprising than the diversity of response which pupae, even of the same kind, and age, will make. One individual will emerge in a few days; its companion will take as many weeks. Odd ones, even of kinds usually amenable to forcing, may resist it and refuse to emerge until the proper time of year arrives.

The warmer atmosphere generally makes the moths alert and active, and the males at least of many species begin to fly as soon as their wings have dried. Notodonts and Bombycids are the chief offenders, and as the former have, in addition, an awkward habit of emerging late in the evening or through the night, they are by morning generally worthless as cabinet specimens. But their nocturnal rioting may be partly checked by removing the cage from the warm mantelpiece to a cooler situation, and restoring it to its proper position in the morning.

Apart from occasional accidents there is much to be said in favour of forcing, for it is a great pleasure to see and set some moths in the dreary days of winter. And so long as the atmosphere in the cage is kept damp, and only species forced that are likely to prove amenable, there is no reason why the proportion of cripples should be any greater than when the moths are allowed to emerge in the normal way.

LATE DATES FOR BUTTERFLIES.—Perhaps the most noticeable effect of the exceptionally cold backward spring in this district was the late date many species remained on the wing rather than their late first appearance. Dates last seen: *Euchloë cardamines* (July 6), *Callophrys rubi* (July 6), *Aricia agestis*, first brood (July 17), *Polyommatus icarus*, first brood (July 19), *Celastrina argiolus*, first brood (June 24), *Erynnis tages* (July 9), *Pyrgus malvae* (July 10) and hibernated species *Aglais urticae* (July 5), *Nymphalis io* (June 27), *Gonepteryx rhamni* (July 5). *Pieris rapae* was not seen until May 10, and the spring brood was very scarce. *Coenonympha pamphilus* was first seen June 5, and *Maniola jurtina* June 29.—S. B. HODGSON; 42, Cromwell Gardens, St. Neots, Hunts, October 7, 1941.

THE BRIGHT COLLECTION SALE.

For some years past there has been much speculation as to what eventually would happen to the late Mr. P. M. Bright's collection. It is believed that at one time it was offered to Bournemouth under conditions which were not acceptable. However, the matter is now settled, the greater part of the collection coming under the hammer, the remainder, consisting of *Polyommatus icarus*, *Lysandra bellargus* and *Lysandra coridon*, having been bequeathed to the South London Entomological and Natural History Society.

The first portion was sold on October 29 last at Messrs. Glendining & Co.'s Auction Rooms. The lots offered consisted entirely of aberrations of the British butterflies in 193 lots. There was a large gathering of buyers and the prices realized on the whole were high. The 229 specimens fetched £933 3*s*., an average of £4 1*s*. 7*d*. each.

The first lot was a *Papilio machaon* ab. *niger* which was cheap at £12 10*s*.; another with a heavy border was sold for £1 12*s*., and a striking rayed specimen went for £10 10*s*. A pair of *Pontia daplidice* went for £3—rather more than they were worth. Two *Pieris brassicae*, a yellow female and a coffee-coloured specimen bred by the late Percy Richards, fetched £4. A good *Danaus plexippus* taken at Bournemouth on August 30, 1886, realized a high figure at £5 5*s*. The *Pieris napi* consisted of a heavily suffused example of ab. *citronea*, which went for £5 10*s*., and four other ab. *citronea*, which were sold at £5. The *Euchloë cardamines* were a fine lot. Two albinos went for £8 and £7 10*s*.; a male with the usual orange replaced by yellow was not cheap at £8 10*s*.; a specimen with black suffused borders went for £3 10*s*.; a mixed gynandromorph figured by Frohawk, a beautiful specimen, was not dear at £7 10*s*.; a hermaphrodite went for £7 10*s*. An ab. *gardneri* and a spotless specimen of *Leptidea sinapis* at £1 10*s*. were not a bargain. A gynandromorph *Gonepteryx rhamni* went for £5 10*s*.; a male much suffused with orange was cheap at £7 10*s*.; and a remarkable specimen suffused with black on all the wings realized £10 10*s*. Two *Colias croceus* var. *obsoleta* and one with a purple sheen on the hind wings were dear enough at £3; and the same remark applies to another with a greenish tint to the hind wings, which also realized £3. Two *Colias croceus* ab. *helice* at £3 10*s*. and £3 were not cheap.

The *Argynnis paphia* were a very fine lot, which had evidently been selected. A heavily suffused with black ab. *melania* male was sold for £8, and a female of the same form went for £4 15*s*.; a white male, a very rare form, realized £13, and £23 was given for another *albino*; an ab. *confluens* at £4 15*s*. and a female of the same form at £6 were not dear; an ab. *valezina*, with a remarkable blue ground-colour, was worth the £7 it went for; an intermediate between ab.

valezina and the type realized £3 10*s*., and a melanic example of *valezina* went for £13 10*s*.—a high figure. A male with large white patches on the wings was dear enough at £3 10*s*. in spite of its having been figured by Frohawk; another at 15*s*. was a more reasonable price. A very fine almost entirely black male was not dear at £12; an ab. *obsoleta* male realized £5, while a specimen with three wings ab. *valezina* and the fourth partly type was cheap at £4. An *Argynnis cydippe* (*adippe*) with the fore wings nearly all black realized £7; three others, a banded male, a straw-coloured male and one with the spots obsolete were bought for £2 10*s*. each; a brick-red specimen went for £3 5*s*.; a beautiful female heavily suffused with black, was probably worth the £13 paid for it; a light yellow female was sold at £8; a banded and rayed female realized £3 15*s*.; and an underside streaked with silver was bought for £4 10*s*. The five *Argynnis aglaja* included in this sale were all exceptional examples; the first, a very rare male albino, realized £23; a fine var. *charlotta*, with greatly enlarged spots, £9 10*s*.; an almost entirely black specimen with rayed borders went for £14; and a specimen suffused with black realized £6. The larger fritillaries keep up their prices. The *Argynnis euphrosyne* consisted of a number of remarkable specimens. A tawny example with metallic markings, figured by Morley, went for £23; a spotless male, £12; another obsolete form, £8; and a melanic female, a beautiful example, £15; heavily suffused specimens went for £8 10*s*., £5, £4 and £2 13*s*.—good prices in every case; a heavily suffused specimen realized £11; various undersides from yellow to reddish sold at prices ranging from £2 to £5. Two examples of *Argynnis selene* with obsolete spots went for £7 and £6 each; a specimen clouded with black on all the wings was bought for £5, and a very fine melanic example realized no less than £26—the highest price of the sale. Two ab. *navarina* of *Melitaea athalia* were bought at £2 15*s*. and £3 10*s*., and a rayed underside for £2 15*s*. Melanic *Euphydryas aurinia* were sold for £2 8*s*., £2 6*s*. and £2 15*s*. each—very good prices; the underside with wide white marginal bands went for £2 10*s*. A male and female *Argynnis lathonia* were bought for £1 10*s*. each—quite as much as they were worth. A specimen of *Melitaea cinxia* from the Webb Collection, with obsolete fore wings, went for £1 10*s*.; another heavily banded one, also from the Webb Collection, realized £2 4*s*.; and a white and brown underside sold for £3 10*s*. The fritillaries were strongly represented at this sale and realized, on the whole, very high prices.

Two specimens of *Polygonia c-album*, with all the wings heavily banded, went for £5 and £6 each, and a hermaphrodite of this species was cheap at £3 7*s*. 6*d*. An ab. *nigrocaria* of *Aglais urticae*, the best of the *urticae*, realized £7, an example with rayed hind

wings £4 10*s*., and a whitish form went for £2. A remarkable *Nymphalis polychloros*, with banded costal spots, realized £8 10*s*.—not too high a price to give for this specimen, varieties of *polychloros* being very rare in this country. A beautiful rayed *Vanessa cardui* went for £13—not too high a price to give for this specimen; a whitish form of the same species was sold for £8—not so good. The specimen of *Vanessa atalanta* figured by Morley was bought for £5, a form with light red bands, £2 15*s*., and an underside with broad bands realized £4 5*s*. The specimen of ab. *belisaria* of *Nymphalis io* was cheap at £3 10*s*.; a green-tinted example went for £5 5*s*. *Limenitis camilla* (*sybilla*) ab. *nigrina* at £5 and *semi-nigrina* at £3 were not bargains. The specimen of *Nymphalis antiopa*, black with blue spotted border and outer costal missing, was probably worth the £7 it was bought at. A fine male *Apatura iris* var. *iole* was sold for £7 10*s*., and a female of the same form went for £6 10*s*.—a fair price for this rarity.

A very fine *Satyrus galatea*, with reduced markings, was bought for £13; a light brown example went for £4. An example of *Pararge megera* with light hind wings was bought for £4—a high price to give for a rather poor specimen; a nearly white *Maniola jurtina* realized £4 10*s*., a golden female £4 15*s*., and a white female with golden area on the upper wings fetched £8—a high price. Two *Aphantopus hyperantus* ab. *lanceolata* at £2 10*s*. were not bargains; a poor specimen but a very remarkable one figured by Frohawk fetched £5. Two *Maniola tithonus* ab. *minkii* realized £2 each, and a light yellow form of the same species went for £3 10*s*. Specimens of *Coenonympha pamphilus* ab. *alba* sold for £1 10*s*. each—a good price. The *Lycaena dispar* were fine specimens, which realized £5, £6 10*s*. and £8 each for the males, and £7, £7 15*s*. and £8 each for the females; an underside of the female were bought for £5 5*s*. Amongst the *Lycaena phlaeas* were some striking examples: ab. *alba* went for £1 1*s*. to £2 10*s*. each, ab. *schmidii* from £1 1*s*. to £3 10*s*. each, ab. *radiata* from £5 5*s*. to £9 each, heavily striated uppersides from £2 5*s*. to £3 7*s*. 6*d*. each; two specimens of the rare ab. *bipunctata* realized £4 15*s*. and £5. There were only three specimens of *Maculinea arion* in the sale; an obsolete underside, figured by Frohawk, went for £12, and a spotless upperside and a heavily marked female sold for £3. Two colour forms of *Plebejus argus* (*aegon*), a lilac and a "khaki" upperside, realized £2 and £4 each—rather more than they were worth; a hermaphrodite, left side male and right side female, was bought for £4 10*s*.; two ab. *striata* fetched £5 and £4 5*s*. respectively; and an *obsoleta* and two undersides realized £2 4*s*. The *Cyaniris semiargus*, a pair in good condition, were bought for £2. A yellow and a light brown form of *Aricia agestis* (*astrarche*) went for £2; and an ab. *striata*,

which had been repaired, realized £3 15*s*. Two obsolete *Cupido minimus* went for 11*s*. and £3 15*s*. each; a very fine ab. *striata*, a rare form in this species, went for no less than £12 10*s*. There were a few *Lysandra coridon* in the sale; two good ab. *fowleri* went for £1; a female ab. *cinnameus* sold for £1 12*s*.; a "khaki" form for £3 5*s*., and a fine ab. *livida* realized £2 10*s*.; three var. *syngrapha* were cheap at 18*s*.; several streaked forms went at £1 1*s*., £1 2*s*. and £2 2*s*. for lots of three; two female ab. *fowleri* were bought for £2 2*s*.; an ab. *caeca* and two ab. *metallica* fetched £1 4*s*.; and two not too good female ab. *cinnameus* realized £2 12*s*.

W. R.-S.

NOTES AND OBSERVATIONS.

Colias croceus Fourc. in the Isle of Harris.—On August 1 of the present season, as I was working in the Luskentyre sand dunes, South Harris, I observed a very strange looking butterfly flying along a dune hollow. Thinking that I had to do with some strange aberration of *Eumenis semele* or *Maniola jurtina*, in spite of the fact that I had no net, I made frantic endeavours to catch it, and in the end succeeded. My surprise may be imagined when I discovered that I had captured an almost scaleless and hopelessly ragged female example of *C. croceus*. It was enclosed for eggs, but died a week later without laying. Clearly it formed one of the last of the June immigration of the insect. On the same day, and in the same area, on the little stream running down from Beinn Bheag I noted the only example of *Plusia gamma* seen in the Outer Hebrides this season.—Prof. J. W. Heslop Harrison; King's College, University of Durham, Newcastle-upon-Tyne.

Lysandra coridon at Folkestone.—Folkestone is not usually regarded as a good place for *coridon*, and indeed the insect usually occurs in small numbers there. It tends, however, to vary a good deal, chiefly in the direction of obsolescence, and occasionally it appears in considerable numbers. That happened six or seven years ago and has happened again this year. I visited a restricted area of the Downs on August 3, 9, 10, 16, 17, and 24. The weather was on each occasion wet or windy or both, but the insects were, considering the small space worked, decidedly numerous. Altogether I examined about 1600 specimens, the highest number on any one occasion being 400 on August 10. The amount of variation appeared to be greater than in most of the haunts of the insect. This, of course, is a mere expression of opinion, and is of little value unless supported by particulars of the percentage of specimens showing variation and the naure of that variation, The following details may not be conclusive, but at least they may suggest a standard of comparison with other localities. I have taken as my basis such named forms

as could easily be recognized as being varieties by the uninitiated. These fall into the following groups:—

A. *Colour forms:*

One female with blue hind wings (always rare at Folkestone).

B. *Melanism:*

One female with brown fringes and brown rings round the spots.

One male with grey fringes and the underside suffused with grey.

One " black " male.

C. *Increased markings on the underside:*

One with exceptionally large spots (*magnipunctata*).

Two *costajuncta*.

Two with elongated spots, the beginning of striation.

Three *arcuata*.

One *biarcuata*.

D. *Obsolescence.*

Eight with several or all the spots missing on the hind wings.

One *obsoleta* on all four wings.

This gives a total of 22, or nearly $1\frac{1}{2}$ per cent. No doubt a good many of the specimens examined were examined more than once, and no doubt some aberrations were overlooked, especially *arcuata*, which is not easily detected unless one is looking specially for it. So the percentage might well be $1\frac{3}{4}$. The two melanic males, the *biarcuata* and the *obsoleta*, might perhaps rank as major varieties, which gives a proportion of one in 400—not bad going in my experience.—A. M. Morley; County Education Office, Springfield, Maidstone, Kent, September 24, 1941.

Records of Limenitis camilla in Herts.—I notice in the September *Entomologist* a note by Mr. Shore of *L. camilla* in a wood near Mill Hill in July last. As Mill Hill is on or very near the Herts border the following records of this butterfly may be of interest as showing the spread of the species to and in the county; where no numbers are mentioned the reports refer to one specimen only: Symond's Hyde, 1916; Broxbourne Woods 1933, in numbers 1934, abundant 1935 and every year since, very plentiful in 1941 and two ab. *nigrina*; Bricket Wood 1935, 1936, 1937, several in each year, common in 1941 with one *nigrina*; Ashridge 1935; Harpenden 1937; Hatfield 1937; Cuffley Great Wood 1939; Haileybury 1939, 1941; North Mimms Park 1940; Tring district frequent in 1941; Lawrence End near Luton 1941; recorded also from Northchurch and Ware. Incidentally I should welcome further records of this or any other species of Lepidoptera (especially " Micros ") known to have occurred in Herts, giving if possible dates and localities.—(Dr.) Arthur H. Foster (recorder for Herts); 13, Tilehouse Street, Hitchin.

Butterflies Attacked by Robin.—I was very interested to see a robin the other morning make short jumps into the air along a

row of *Sedum spectabile* in full flower in my garden at a swarm of *Aglais urticae*, *Polygonia c-album* and *Vanessa atalanta* which were feasting on the blossoms. I did not see the bird catch any of the butterflies, but I noticed specimens with the hind wings half pecked away, no doubt caused by near misses of the aggressor.—B. HAROLD SMITH; Casa, Frensham Vale, Lower Bourne, Farnham, Surrey.

PARASEMIA PLANTAGINIS BRED DURING THE AUTUMN.—South mentions an instance where a few larvae of the Wood Tiger fed up during the late summer and emerged in the autumn. Possibly many may not be aware how easy it seems to be to prevent them from hibernating. Mr. J. O. T. Howard was successful in breeding out a fine series during the late months of 1939 by keeping the larvae exclusively in small tins in which they fed up rapidly. Following his advice I kept a large brood from a June parent in glass-topped tins, feeding them on dandelion and dock on which they thrived. These nearly all reached maturity by mid-September and the moths began emerging a fortnight later.—C. G. M. DE WORMS; Salisbury, October, 1941.

STILPNOTIA SALICIS IN SHETLAND.—During my visit to the island of Unst, Shetland, in July, 1938, a living male of *Stilpnotia salicis* was brought to me. It was found at rest on heather near the western side of the loch of Cliffe, and was in rather worn condition. I believe this is the first record of this species from Shetland, and I assume it to have been an immigrant.—EDGAR J. HARE; Harrow Place, Pinden, Dartford.

LEPIDOPTEROUS LARVAE FEEDING ON CEREALS.—In Wiltshire during June larvae of *Procus literosa* Haw. were found feeding within the stems of wheat, oats, barley and rye, causing the central leaf to turn yellow. Young larvae of *Hydraecia micacea* Esp. were feeding at the base of the stems of wheat, oats and barley, also causing a yellowing of the shoot. It would be interesting to know whether larvae of *micacea* can complete their existence on cereals or whether they wander into docks, etc., when they become too large for the cereal stems. Larvae of *Luperina testacea* Schiff. were also found feeding at the roots of wheat, oats and barley, causing the plants to wither. Larvae of this species were also reported by Mr. Jary to have practically destroyed a field of wheat following a grass ley, at Birchington, Kent. The larvae of these three species were more plentiful, in Wiltshire, along the headlands, which adjoin the grassy banks and droves bordering the fields. From this fact one must presume that the larvae had wandered into the crops, as they became scarcer the further one went into the fields.—H. M. EDELSTEN; Plant Pathological Laboratory, Harpenden.

HELIOTHIS PELTIGERA IN S.W. KENT.—I took a female of this species at dusk on valerian on June 25 and obtained fertile ova. The first imago emerged on August 7.—G. V. BULL; White Gables, Sandhurst, Kent, October 19, 1941.

CORRECTION.—P. 251, first column, line 9, for *pilosellae* read *purpuralis*.

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